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NUMBER 3

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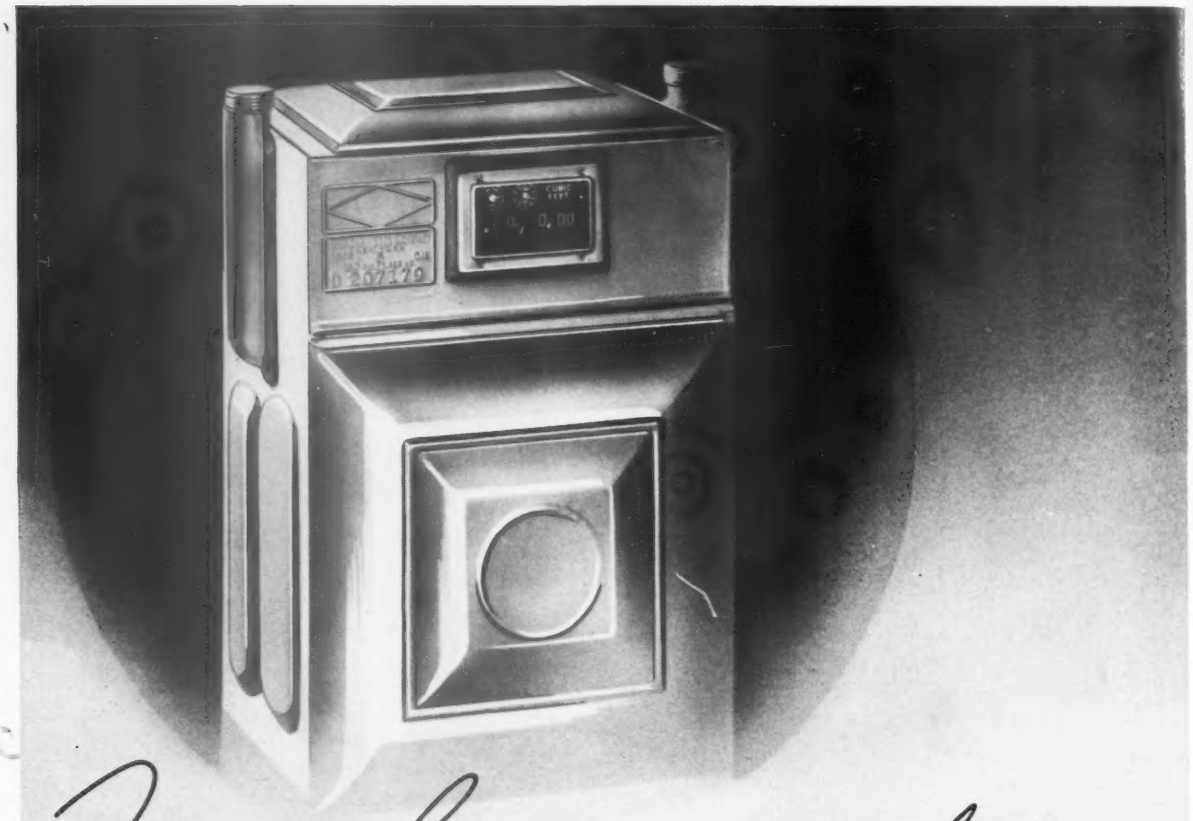

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Sectional and departmental headquarters and meetings will be as follows: Natural Gas Department and Technical Section at the Hotel Ambassador; Accounting Section at the Ritz-Carlton Hotel; Commercial and Industrial Gas Sections at the Hotel Traymore.

N. C. McGowen, President of the United Gas Pipe Line Co., Houston, Texas, and this year's President of the American Gas Association, will preside throughout the convention. Widely known and respected for his grasp of the industry's problems, his Presidential Address is expected to be a high spot on the program. As President of the Association, Mr. McGowen has given unsparingly of his time and ability.

A major concern of the gas industry has always been that of finding ways and means of giving complete satisfaction to the woman consumer. This problem, so vital to maintenance of the domestic load, has been given an important place on the general sessions program. Under the title, "Mrs. Consumer Looks at Her Gas Utility," Mrs. Blanche Hendrickson, chairman of the American Home Department of the New York State Federation of Women's Clubs, will present her views of this subject. Mrs. Hendrickson who is also chairman of the Advisory Committee on Consumer Interests for the New York World's Fair, is one of the best known woman authorities on consumer education. She has contributed to many consumer magazines and has been consulted by many business concerns with regard to consumer problems.

N. C. McGOWEN
President American Gas Association

Dr. E. R. Weidlein, director of Mellon Institute of Industrial Research, Pittsburgh, Pa., and prominently and actively identified with it for 25 years, will talk on "The Aid of Research to Industry." A scientist and inventor, Dr. Weidlein is the author of many articles on industrial research achievements.

Alexander M. Mahood, president of the National Association of Railroad and Utilities Commissioners and a member of the West Virginia Public Service Commission, will address the convention on the developments in the broad field of utility regulation. Mr. Mahood's paper on this subject before the New Orleans meeting of the Natural Gas Department in May aroused such interest that he was invited to bring the convention up to date on this important subject.

DR. E. R. WEIDLEIN HON. ALEX. M. MAHOOD CHARLES G. GROFF

Book Reviews

Public Utility Regulation, by G. Lloyd Wilson, James M. Herring and Roland B. Eutsler. Published by the McGraw-Hill Book Company, Inc., New York, N. Y. 571 pages. Price: $4.00.

This book presents an analysis of the nature, extent, and problems of public utility regulation in the United States. The authors approach this subject by considering the historical development of regulation and the emergence of the state public utility commission as the prevailing pattern of regulatory machinery. The problems of state versus local regulation are reviewed, and the state commission, as a regulatory agency, is critically evaluated. The subjects of regulation are then analyzed; regulation of accounting and reporting, rates and valuation for rate-making purposes, rate of return, depreciation, service, security issues, and other aspects are examined from the standpoint of regulatory procedures, techniques, policies, and problems. Issues and conflicts are critically examined. The authors then describe and analyze the expanding role of the Federal Government in respect to the control of public utility industries. The significance and implications of this tendency are evaluated in terms of the possibilities of more effective regulation. In this particular, attention is given to the holding company, the interstate movement of gas and electricity, interstate motor transportation, and communication. Attention is also given to the activities of the Federal Government in undertaking power projects and in promoting rural electrification. What these developments portend to the privately owned power industry and their significance as instances of national economic planning are indicated. Finally, the issues of government versus private ownership are evaluated.

Comfort Heating—American Gas Association. An engineering handbook for house heating and direct heating salesmen.

This is an 82 page, index-tabbed, loose-leaf, lettersize book devoted entirely to gas heating. It is not a formidable engineering treatise but does contain all necessary tables and rules for quick computation of heating requirements and selection of equipment simply and clearly presented. It is a valuable item in the kit of all heating salesmen whether they represent utilities or dealers. Price of single copies $2.00.

Obituary

SAMUEL INSULL

Samuel Insull, once head of a vast utility system, died suddenly of a heart attack in Paris, France, on July 15.

He was born in London on Nov. 11, 1859, and was educated in London, Reading and Oxford. He never pretended, in later life, that he had attended the university at the latter city, and he never made any attempt to conceal his early humble upbringing.

In his spare hours young Insull had mastered the art of shorthand and for some time he was employed by Bowles, the editor of Vanity Fair. Later, after answering a newspaper "card," he found employment with Colonel E. H. Johnson, who was the manager for Thomas A. Edison in London.

His main chance—and he was quick to grasp it—came when the Chicago Edison Company, one of the earliest units formed for the exploitation of electric light, needed a competent manager.

There were many difficulties to be overcome. Chicago had no less than seven utility companies which fed the city electric light and gas. The various stations could only feed restricted areas, and the Edison concern was in a precarious situation. But gradually Mr. Insull absorbed other companies—his enemies used the word "gobbled"—and with the advent of the Curtis turbine in 1903, Insull, inspired to action, overrode the timid objections of his more conservative assistants and had the new turbines installed.

By 1907 his company, the Commonwealth-Edison, served all Chicago, and the six main competitors had ceased to exist. Insull had manipulated many strings that tied themselves into mergers and combinations not only in the gas and electric field; he had also acquired transit lines, surface and elevated. He had gradually expanded his network of lines from Chicago to the suburbs, and thence throughout Illinois and the neighboring States.

The Middle West Utilities supplied 1,718,000 customers, or a population of at least 10,000,000. There were 600,000 security holders. The mammoth organization operated 324 steam plants, 196 hydro-electric generating plants and 328 ice plants. The power transmission was along 44,500 miles of lines. Gas for cooking fed out of 10,600 miles of main.

In 1932 his top-heavy system began to disintegrate and he died a relatively poor man.

FRANK R. COATES

Frank R. Coates, well known public utility, railway and oil executive, died June 26th after a long illness, at his home in Avon, New Jersey. Earlier in the week, Mr. Coates celebrated his 69th birthday.

Mr. Coates' wide experience stood him in great stead in his every connection and proved of high value in the management of the Toledo Railways and Light Company, and later, the Toledo Edison Company, of which he subsequently became president and general manager.

The present smoothly functioning organization in Toledo speaks volumes for the all around capabilities of Mr. Coates, who numbered his friends there and in other cities by the thousands.

At the time of his death, Mr. Coates was president and a director of Cities Service Oil Co. (Pa.); Community Traction Company; Tampico Texas Petroleum Corp.; The Toledo Edison Company; Interurban Station Company; Mexico-Eastern Oil Company and Penn-York Natural Gas Corp. He was also a vice-president and director of Cities Service Power and Light Co.; Empire Gas & Fuel Co.; Indian Territory Illuminating Oil Co.; and the Toledo Light and Power Co.; and a director of Cities Service Company, Arkansas Louisiana Gas Company, Arkansas Natural Gas Corp., Colorado Wyoming Gas Co.; Consolidated Cities Light, Power & Traction Co., and Federal Light & Traction Co.

FRANK F. CORBY

Frank F. Corby, special representative of the tubular products sales department of the Jones & Laughlin Steel Corporation, Pittsburgh, died at his home in Pittsburgh on June 15.

After graduation from St. Louis University, Mr. Corby entered the steel business in 1896 with the National Tube Company in St. Louis. In 1900 he went with the Mark Manufacturing Company of Chicago and Evanston, and on the reorganization of that company as the Steel & Tube Company of America in 1925, he was made vice-president in charge of sales. Later he was associated with the A. M. Byers Company and the Oil Well Supply Company jointly as special Pacific Coast representative, and in 1928 joined Jones & Laughlin Steel Corporation as special sales representative.

CURTIS S. MITCHELL

Curtis S. Mitchell, Vice President and Controller of the Philadelphia Company, Pittsburgh, Pennsylvania, died July 23rd, in Washington, D. C.

Mr. Mitchell was born in Beaver, Pennsylvania, and educated in the public and high schools of that place, after which he came to Pittsburgh, where he spent his entire business life. On August 16, 1897, he entered the service of the United Traction Company of Pittsburgh, and on April 1, 1898, was promoted to the position of Auditor of the Company.

When the Philadelphia Company acquired control of the Allegheny County Light Company, the Consolidated Gas Company of the City of Pittsburgh, and United Traction Company of Pittsburgh, Mr. Mitchell was appointed Assistant Auditor, and on May 1, 1900, was elected Auditor of the Philadelphia Company and Subsidiary Companies. On May 1, 1912, he was elected Controller of these Companies, and on January 1, 1924, a Vice President of the Philadelphia Company.

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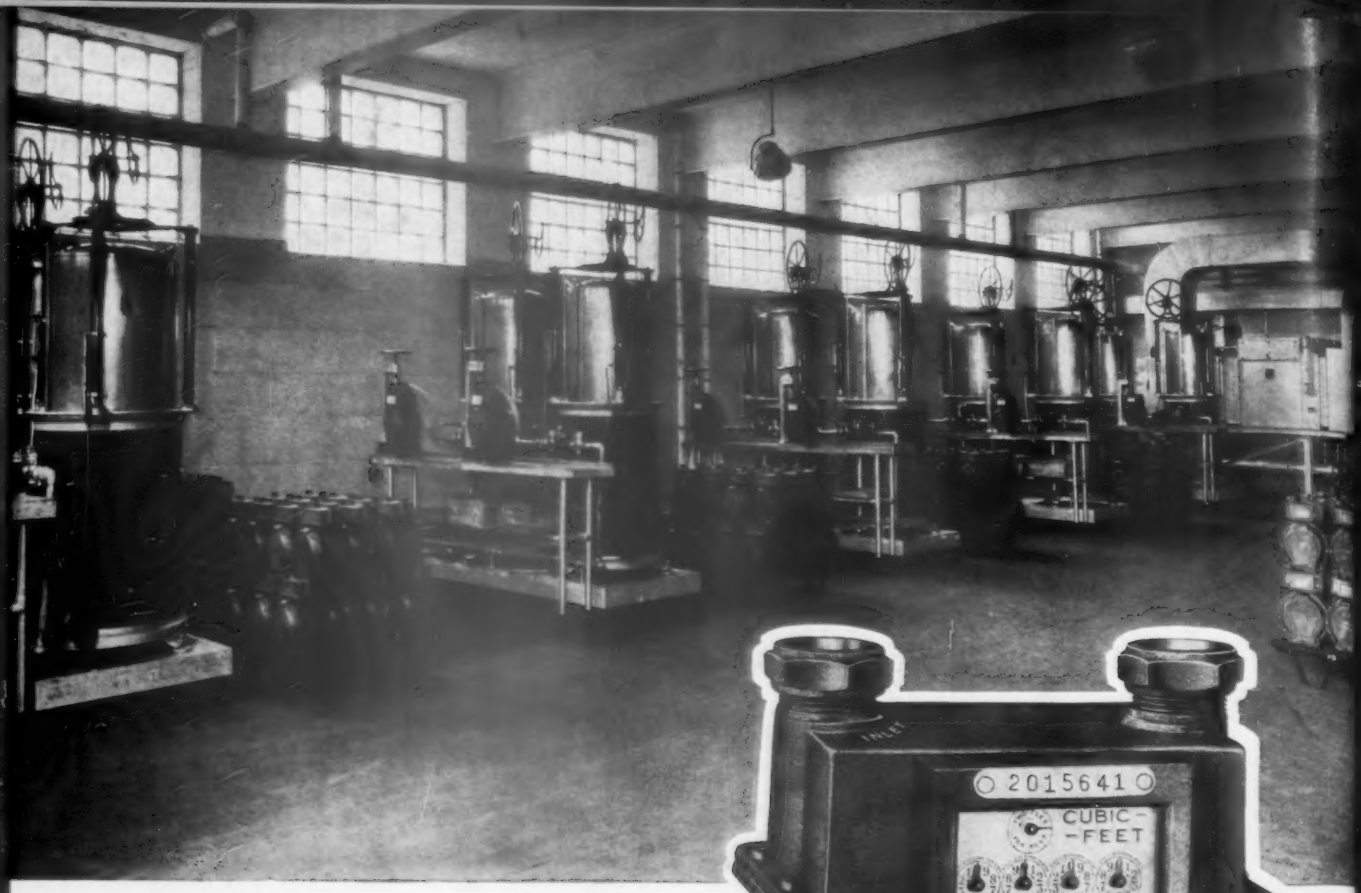

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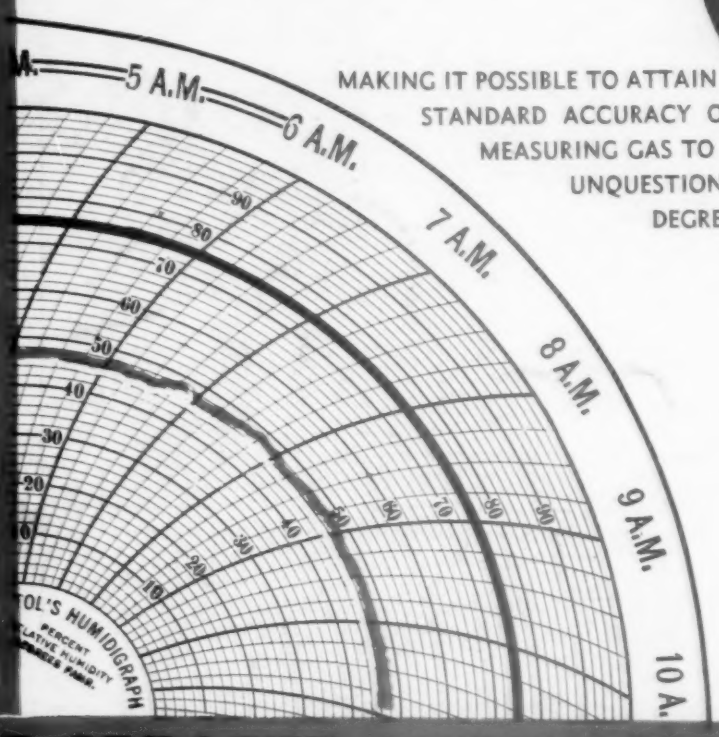

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THE CAST IRON PIPE RESEARCH ASSOCIATION, THOMAS F. WOLFE, RESEARCH ENGINEER, 1015 PEOPLES GAS BUILDING, CHICAGO, ILLINOIS

AMERICAN GAS JOURNAL, September, 1938. Vol. 149, No. 3. Published monthly by American Gas Journal, Inc., at 34 North Crystal St., East Stroudsburg, Pa. Executive and Editorial offices at 53 Park Place, New York, N. Y. Entered as second-class matter, October 7, 1928, at the post office at East Stroudsburg, Pa., under the Act of March 3, 1879.

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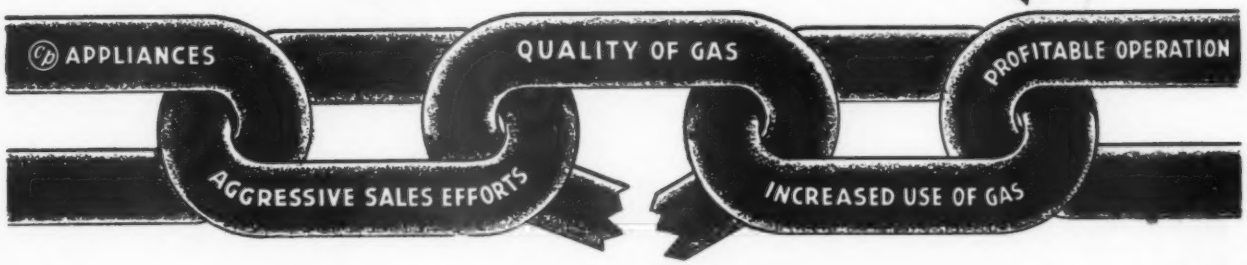

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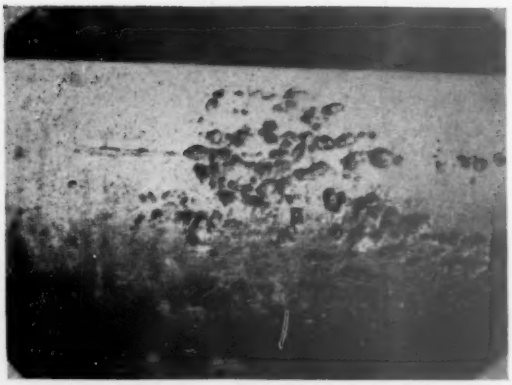

by a writer who has combined knowledge of the subject with practical experience and put them into understandable language for practical men,

Erick Larson

Past Chairman of American Gas Association Distribution Committee; Author of articles on High Pressure Distribution and Regulator Structures.

Fully illustrated with many diagrams, charts, and photos. A general outline of the subjects covered are listed in the adjoining chapter titles:

The Contents Include

History and Research — Definition and Scope of Corrosion — Corrosion Theories — Electro-Chemical Theory of Corrosion — Stray Current Electrolysis —Soil Surveys - The Electrical Characteristics of Soils — Soil Testing with Resistance Rods — Soil Analysis — Laboratory Test for Soil Corrosivity — Burial Tests — Survey by Observation — The Corrosion Survey — Collection and Use of Corrosion Measurements—Summary of Soil Survey Procedure — Necessary Qualities of a Protective Coating—Pipe Surface Preparation — Paints — Petrolatum Coatings—Vitreous Enamel and Synthetic Resin Coatings — Primers — Asphalt Coatings — Tar Base Enamel Coatings — Practical Considerations in Application of Primers, Coatings &c— Pipe Coating Fillers—Pipe Coating Shields — Cement Coatings — Cathodic Protection.

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DR. E. R. WEIDLEIN HON. ALEX. M. MAHOOD CHARLES G. GROFF

"Sales Fundamentals," will be the subject of an address by Charles G. Groff, president of Electrolux, Inc., New York, manufacturers of vacuum cleaners. This concern has an enviable national reputation in the sales field and Mr. Groff will give the members of the gas industry the benefit of his company's experience.

With two great expositions opening on opposite sides of the country in 1939, offering tremendous opportunities for telling the story of modern gas service to millions of visitors, it was thought advisable to outline the gas industry's participation to the convention delegates. This will be done by two of the industry's prominent members. The New York World's Fair will be discussed by Floyd L. Carlisle, Chairman of

FLOYD L. CARLISLE

R. E. FISHER

DR. J. BRIAN EBY

Board, Consolidated Edison Co. of New York, Inc., and the Golden Gate International Exposition plans will be presented by R. E. Fisher, Vice-President, Pacific Gas and Electric Co., San Francisco. Both fairs will have cooperative gas exhibits of large proportions in addition to which there will be individual company exhibits and hundreds of unusual applications of gas.

MERRILL N. DAVIS

The manufacturers' point of view will be presented by Merrill N. Davis, President of the Association of Gas Appliance and Equipment Manufacturers and Executive Vice-President of S. R. Dresser Manufacturing Company, Bradford, Pa. As head of the manufacturers' national association, Mr. Davis is expected to discuss the great progress made in the improvement of gas appliances during the past year and to offer a program of cooperation with the gas utilities.

The convention officially opens with the Natural Gas Department program Monday morning, October 10. This program offers much of interest to everyone in the gas business.

One of the high points of the natural gas sessions will be a paper on "Geophysical Methods of Exploration," presented by Dr. J. Brian Eby, consulting geophysicist of Houston, Texas. Dr. Eby's paper, which will be illustrated with slides, will develop the more pertinent facts concerning the use of geophysics in exploration for the earth's minerals. It will be of particular interest because it will be presented from the viewpoint of a geologist interested in geophysics rather than from a highly technical or mathematical angle.

In addition to the speakers mentioned above, the general sessions program will include addresses on conservation and national advertising by outstanding authorities.

The Entertainment Committee under the chairmanship of H. A. Ehrmann, of the Consolidated Edison Co. of New York, Inc., has arranged a fine program, including the appearance of Miss Jessica Dragonette, long hailed as the "queen of radio" and America's "sweetheart of the air." Miss Dragonette appeared before the 1934 A.G.A. convention in Atlantic City and completely captivated her audience.

Another entertainment feature will be a performance by Joseph Dunninger, world famous master mind of mental mystery, sponsored by the National Broadcasting Company. Dunninger gives a mind reading demonstration which has delighted and mystified many famous audiences.

There will be a President's Dance the evening of October 11 in the American Dining Room of the Hotel Traymore and a Ladies' Bridge and Tea on October 12 in the Sun Room of the Hotel Traymore. Dancing will follow other entertainment on October 12 in the ballroom of the Atlantic City Auditorium. Music will be furnished by William Madden and his orchestra.

Arrangements have been made so that convention delegates may enjoy golfing privileges at the Atlantic City clubs.

Tentative sectional and departmental programs are as follows:

NATURAL GAS DEPARTMENT

MONDAY MORNING, OCTOBER 10

10:00 o'clock

MAIN TECHNICAL AND RESEARCH COMMITTEE

Presiding, HOWELL C. COOPER, *Chairman*
Opening Remarks by Chairman. Committee and Subcommittee Reports.
Geophysical Methods of Exploration, DR. J. BRIAN EBY, Consulting Geophysicist, Houston, Texas.
Small Intermediate Compressor Stations as a Means To Increase Main Line Capacity, H. C. WALLACE, Chief Engineer, Commonwealth Gas System, New York, N. Y.
Main Technical and Research Committee Roundtable Luncheon.

MONDAY AFTERNOON

2:00 o'clock

Opening Remarks by Chairman, ROBERT W. HENDEE, General Manager, Colorado Interstate Gas Co., Colorado Springs, Colo.
Why Not Eliminate the Waste? ELMER F. SCHMIDT, vice-president, Lone Star Gas Company, Dallas, Texas.
Regulation of Interstate Natural Gas Pipe Lines, HON. CLYDE H. SEAVEY, Acting Chairman, Federal Power Commission, Washington, D. C.
Address: (Subject To Be Selected), GENERAL BAIRD H. MARKHAM, Director, American Petroleum Industries Committee, New York, N. Y.
Report of Nominating Committee.
Election of Officers.
Adjournment.

ACCOUNTING SECTION

TUESDAY, OCTOBER 11

2:00 o'clock

Address of Chairman, D. H. MITCHELL, Northern Indiana Public Service Co., Hammond, Ind.
Nominating Committee, H. E. CLIFF, *Chairman*, Public Service Electric & Gas Co., Newark, N. J.
Luncheon Conference Committee, T. S. LEVER, *Chairman*, The Philadelphia Gas Works Co., Philadelphia, Pa.
Customer Relations Committee, Panel Discussion—Team Work and Customer Relations—What Are We Doing About It? BLACKWELL NEWHALL, *Chairman*, The Philadelphia Gas Works Co., Philadelphia, Pa.
Uniform Classification of Accounts Committee, Depreciation Committee, H. C. HASBROUCK, *Chairman*, Associated Gas & Electric Co., New York, N. Y.
General Accounting Committee, H. C. MOORE, JR., *Chairman*, New England Gas & Electric Association, Cambridge, Mass.
(a) The Straight Line Depreciation-

Accounting of Telephone Companies, A. B. CRUNDEN, American Telephone & Telegraph Co., New York, N. Y.

(b) New and More Rigid Distinction Between Capital and Maintenance Expenditures and Its Effect on Depreciation Allowances for Income Tax Purposes, CARL LUEBKE, The Peoples Gas Light & Coke Co., Chicago, Ill.

THURSDAY, OCTOBER 13

2:00 o'clock

Accounting Machines Committee, Application of Machines to Payroll Accounting, G. W. FUCHS, *Chairman*, Philadelphia Electric Co., Philadelphia, Pa.

Office Management Committee, W. C. TERRY, *Chairman*, Nashville Gas & Heating Co., Nashville, Tenn.

The Necessity for Supervisory Training, A. E. HALD, *Chairman*, Consolidated Edison Co., New York, N. Y.

Property Records & Continuous Inventory, O. H. RITENOUR, Washington Gas Light Co., Washington, D. C.

Customer Accounting Committee, JOHN A. WILLIAMS, *Chairman*, Niagara Hudson Power Corp., Syracuse, N. Y.

(a) Pet Procedures, W. R. SEIDEL, *Chairman*, Rochester Gas & Electric Corp., Rochester, N. Y.

(b) Collection Routines, M. D. COUGHLIN, *Chairman*, The Hartford Gas Co., Hartford, Conn.

ACCOUNTING SECTION LUNCHEON CONFERENCES

WEDNESDAY, OCTOBER 12

Hotel Ritz-Carlton, Atlantic City, N. J.

12:30 o'clock

Customer Accounting, R. B. MILNE, Leader, Columbia Engineering Corp., New York, N. Y.

Customer Relations, IRVING K. PECK, Leader, Binghamton Gas Works, Binghamton, N. Y.

Credit & Collection, E. N. KELLER, Leader, Philadelphia Electric Co., Philadelphia, Pa.

General Accounting, H. L. DALBECK, Leader, Cambridge Gas Light Co., Cambridge, Mass.

COMMERCIAL SECTION

TUESDAY, OCTOBER 11

2:00 o'clock

Address of Chairman, HUGH CUTHRELL, The Brooklyn Union Gas Co., Brooklyn, N. Y.

Report of Nominating Committee, F. M. BANKS, *Chairman*, Southern California Gas Co., Los Angeles, Calif.

Election of Officers.

The Certified Performance Range Program

The Certified Range Activity to Date, F. M. HOUSTON, *Chairman*, Domestic Range Committee, Rochester Gas & Electric Corp., Rochester, N. Y.

The Future of the Certified Range, R. S. AGEE, Sales Promotion Mgr., Association of Gas Appliance and Equipment Manufacturers, New York, N. Y.

What 130,000,000 People Want To Know, E. C. SORBY, Geo. D. Roper Corp., Rockford, Ill.

Discussion.

We're Not Ugly—It's Just the Way We Dress, R. C. RATLIFF, Kansas City Gas Co., Kansas City, Mo.

WEDNESDAY, OCTOBER 12

2:00 o'clock

Making a Water Heater Sale—*A Skit*. Presented by G. F. B. OWENS. Enacted by Personnel of The Brooklyn Union Gas Co., Brooklyn, N. Y.

Home Service and Sales, MILDRED CLARK, *Chairman*, Home Service Committee, Oklahoma Natural Gas Co., Tulsa, Okla.

The Susceptibility Quotient—End Product of Sales Promotion, H. D. VALENTINE, The Peoples Gas Light and Coke Company, Chicago, Ill.

Selling and Merchandising of Gas and Gas Appliances, CHAS. G. YOUNG, Springfield Gas Light Company, Springfield, Mass.

THURSDAY, OCTOBER 13

SPECIAL EXECUTIVE LUNCHEON

1:00 o'clock

Presiding: HUGH CUTHRELL, *Chairman*, Commercial Section, Brooklyn Union Gas Co., Brooklyn, N. Y.

MILDRED R. CLARK

HOME SERVICE

BREAKFAST

WEDNESDAY MORNING, OCTOBER 12

8:30 o'clock

American Dining Room—Hotel Traymore (Tickets should be purchased by 5:00 P.M., Tuesday, October 11, at A.G.A. Registration Desk. Tickets $1.25)

Presiding: MILDRED CLARK, *Chairman*, Home Service Committee, Oklahoma Natural Gas Co., Tulsa, Okla.

Greetings, N. C. MCGOWEN, *President*, ALEXANDER FORWARD, Managing Director; H. H. CUTHRELL, *Chairman*, Commercial Section, American Gas Association.

Pacific Coast Activities Include Tradedealer Cooperation, GLADYS PRICE, Southern California Gas Co., Los Angeles, Calif.

Facts and Figures on Home Service Operation, HELEN SMITH, Rochester Gas & Electric Corporation, Rochester, N.Y.

Kitchen Parties—A Plan To Increase Load, EDNA MOHR, Pennsylvania Power & Light Corp., Allentown, Pa.

Home Service "at Home" on the Sales Floor, PAULINE WATSON, The Gas Service Co., Topeka, Kansas.

Home Service in the CP Range Program, RUTH SOULE, The Brooklyn Union Gas Co., Brooklyn, N. Y.

INDUSTRIAL GAS SECTION

TUESDAY, OCTOBER 11

12:15 o'clock

THE INDUSTRIAL GAS CLUB LUNCHEON

Speaker—GEORGE S. HAWLEY, President, The Bridgeport Gas Light Co., Bridgeport, Conn.

(All delegates to the convention, and all persons interested in the promotion of non-residential gas and appliance sales, are invited to attend the Club Luncheon. Tickets are on sale at the Registration Desk. (Price $1.50)

TUESDAY AFTERNOON, OCTOBER 11

2:00 o'clock

Address of Chairman, Important Steps in the Progress of Industrial and Commercial Gas during the Past Year, HALE A. CLARK, Detroit City Gas Co., Detroit, Mich.

Report of Committee on Nominations, RALPH L. MANIER, *Chairman*, Central New York Power Corp., Syracuse, N.Y.

Securing and Holding Pressing Machine Business.

Relative Importance of Dehumidification and Cooling in Air Conditioning, CHARLES L. LEOPOLD, Consulting Engineer, Philadelphia, Pa.

(Introduction by CHARLES R. BELLAMY, Columbia Gas & Electric Corp., *Chairman*, Industrial and Commercial Air Conditioning Committee.)

Bringing Insulation Facts Up-to-date, Johns-Manville Corp., New York, N. Y.

WEDNESDAY AFTERNOON, OCTOBER 12

2:00 o'clock

How Far Have We Gone in Modernizing Commercial Kitchens? Leader: GEORGE L. CULLEN, Harrisburg Gas Company, Harrisburg, Pa.

(a) Hotels, HUGH L. WATHEN, Atlantic City Gas Co., Atlantic City, N.J.

(b) Institutions, ————, American Stove Co.

(c) Restaurants.

Sales Features of Today's Gas Commercial Cooking Equipment, Leader: HARRY A. SUTTON, Public Service Electric & Gas Co., Newark, N. J.

(a) Ranges.

(b) Broilers, HARRY M. WOOLMAN, Jersey Central Power & Light Co., Asbury Park, N. J.

(c) Fat Fryers, JAMES F. PITMAN, J. C. Pitman & Sons, Inc., Lynn., Mass.

(d) Counter Appliances

Expanding Markets for Commercial Gas Sales, Leader: ARTHUR M. APMANN, Derby Gas & Electric Co., Derby, Conn.

THURSDAY AFTERNOON, OCTOBER 13

2:00 o'clock

Have We Been Overlooking Opportunities in Small Industrial Uses for Gas? (Symposium)

To be participated in by CHARLES T. BENNETT, Consumers Gas Co. of Toronto, Toronto, Ontario; W. W. YOUNG, Watertown, Conn., and others.

(a) Miscellaneous Industrial Equipment.

(b) Bench and Other Equipment.

(c) Small Industrial Equipment.

Successful Methods for Promoting the Sale of Standardized Industrial Gas Equipment.

(Symposium)

Leader: D. W. CHAPMAN, The Peoples Gas Light & Coke Co., Chicago, Ill.

(a) Heat Treating Furnaces, ELMER C. COOK, American Gas Furnace Co., Elizabeth, N. J.

(b) Reel Bake Ovens, CARLTON W. ROLL, The Brooklyn Union Gas Co., Brooklyn, N. Y.

(c) Gas Steam Boilers, EVERETT B. MAGNUSON, Eclipse Fuel Engineering Co., Rockford, Ill.

QUESTION BOX

Drop your industrial and commercial gas questions in the *Question Box* any time Tuesday, Wednesday or Thursday. The answers will be given from the platform by the following men:

(Continued on page 42)

Selection of Coals for Gas Making in Horizontal Retorts

The Many Factors Necessary to Find the Right Fuel for Maximum Yield Are Listed and Explained

By

R. C. Downing

General Superintendent, Taunton (Mass.) Gas Co.

COAL has been carbonized in horizontal retorts since the origin of the gas industry, with the object of obtaining a maximum yield of gas at the expense of coke quality or by-product recovery. The tendency in modern carbonization practice is toward other types of installation, such as vertical retorts or coke ovens. The former are better adapted to steaming with production of more gas from a unit weight of coal. The latter permits blending of coals and produces a coke of better structure, which can be marketed more readily. Nevertheless, local conditions still make a few installations of existing horizontal retorts more economical in their operation than other types of equipment. The use of projector belt charging machines for filling the retorts with coal, combined with mechanical rams for discharge of coke, have reduced the labor cost to a unit comparable with other type installations. An advantage of horizontal retorts over verticals for gas making is their greater ability to properly carbonize slack or fine coal, without encountering operating difficulties, and their ability to produce a coke of better structure which is denser and meets the demand of the domestic market more satisfactorily. A disadvantage is the larger amount of ground area required for a given production of gas.

Classification of Coals:

By Type: Bright or common coals are the type selected for horizontal retorts. Splint and cannel coals are eliminated because of their inability to fuse and produce coke of any kind.

Originally prepared for National Association of Purchasing Agents, 11 Park Place, New York.

By Rank: This classification involves a knowledge of fixed carbon and B.T.U. weathering index and agglutinating value. The higher the B.T.U. on the moisture ash free basis, the better will be the coal for any definite fixed carbon value. Under this condition, the heating value of the volatile matter will be greater and a richer volatile matter will produce either more gas or tar, and generally both. High volatile A bituminous coals, with dry fixed carbon less than 69% and moist B.T.U. above 14,000, are good gas coals. Gas coals should withstand excessive weathering and their agglutinating values should be sufficiently high to indicate good coking possibilities, i.e. above 500 G. at a ratio of 15 parts of sand to 1 of coal.

By Grade: In addition to heating value, this classification considers the quality of the coal, such as ash and sulphur content and softening temperature of the ash. For horizontal retort practice, a coal with ash less than 5% is desired, depending largely on the coke sales and marketing policy in the community. Customers who are used to burning a coke with low ash object strenuously to coal changes which result in more ash formation. Fusion temperature should be above 2600° F. to avoid trouble with coke clinkers in domestic furnaces, although with proper handling, a softening temperature of the ash may be as low as 2,300° F.

Size of Coal for horizontal retort carbonization is of varying importance, depending on the character of the coal purchased. Certain coals contain larger percentages of ash in the slack or fines. In other coals, there is no difference in ash content of lump coal and slack. When this condition prevails, slack coal is usually a better purchase than sized coal or Run of Mine. There are some slack coals, however, so finely disintegrated that the operation of charging into the retort becomes dangerous because the powdered coal fumes travel backward around the workmen.

Impurities In Coal difficult to remove, as outlined in the Coal Selection Chart, are objectionable. Slaty particles in the coal will appear in the coke and accelerate the degradation of this by-product.

Deviation of Individual shipments from the average is a serious offense and should not be tolerated. In the writer's experience, covering a period of 27 years, this has happened many times and without exception to the detriment of the coal producing company. Eternal vigilance in testing of coals disclosed such deviation and the condition was usually rapidly remedied.

Specific Chemical Properties of Coal as Sampled for Moisture: Coals for horizontal retort carbonization should be shipped from the mines with just sufficient moisture content to avoid loss of dust in handling. The writer considers 2% as a reasonable percentage of water. Heavy rains during transit oftentimes brings the water content up to 6% and 7%. Such wet coal is very

difficult to carbonize with efficiency. The temperature of the retort setting usually drops below the proper degree for good heat transfer, and, unless carbonizing time is extended, charges to retorts decreased in weight, or the temperature of the setting rapidly increased, low yields of gas result and too much volatile matter is left in the coke.

Ash: The importance of ash has been considered, under classification by grade. We reiterate that low ash is a very desirable feature.

Chemical Composition of ash is of little value in selecting a coal. It will indicate the reasons for high or low fusion temperatures but the actual fusion test temperature is a better guide to follow.

In testing for fusion temperature, the softening temperature is of importance. Initial deformation and fluid temperature are of passing interest but they are easily observed when the test is made. Softening temperatures of ash in coal below 2400° may produce cokes which clinker, and below 2200° F. trouble from clinker is almost sure to follow, unless the ash content is exceptionally low in the coke.

Volatile Matter has always been of extreme importance in the selection of a coal but the test alone is misleading unless knowledge of the heating value of the coal is available. Coal will begin to coke when the volatile matter is about 17 per cent but, for gas making purpose in horizontal retorts, a volatile matter of 36 to 38% on the dry ash free basis, combined with a heating value on the same basis of 15,400 to 15,800 is desirable. High volatile of 36 to 38% with B.T.U.s below 15,400 usually indicate high oxygen content in the volatile. Such a coal will produce poor gas yields of low B.T.U., with a brittle coke, and is undesirable.

Fixed Carbon in the coal is dependent upon the ash and volatile matter, varies with these constituents and is important as a basis for determining the heating value of the volatile matter. Carbon at a B.T.U. content of 14,540 contributes a proportion of heat units to the coal. The remainder of the heat units are developed from the volatile matter.

B.T.U. Per Pound is important in a gas coal, but is rarely used alone as a criterion of value. Combined with the proximate analysis results, it is useful in prognosticating the value of gas and tar which will be produced.

Sulphur in Coal for horizontal retort practice should not be more than 1% and preferably below 0.7%. About 70% of the sulphur remains in this coke and, as the production of coke is about 70% of the coal, the per cent of sulphur in the coke will be about the same as exists in the coal. From 20% to 25% of the sulphur content remains in the gas. As legal specifications require that gas for distribution have no hydrogen sulphide, the removal of sulphur constitutes an expense varying with the amount of sulphur to be removed. High sulphur in coal accelerate spontaneous combustion during storage and is objectionable from this point of view.

The Form in Which the Sulphur Exists in coal makes but little difference in the value of the coal, as the temperature of carbonization is above 2000° F., which is sufficient to drive off all the sulphur whether it be present as sulphate, pyrites or organic. However, the organic sulphur should not be present in coal in amounts sufficient to produce a gas from carbonization which will produce more than 30 grains of organically combined sulphur per 100 cubic feet, as this is the legal limit in most states. The usual method of removing hydrogen sulphide in horizontal plants, by dry oxide purification, will not reduce the organic sulphur.

Phosphorus content of coal is unimportant as the coke made in horizontals is never used in industrial furnaces for the production of iron.

Coking Properties of Coal as determined by laboratory tests, such as the coke button and the agglutinating index and specific volatile index, are not of much practical use in selecting coals for horizontal practice. These items are best observed by means of an actual carbonizing test.

Expansion of the Coal under carbonization should especially be noted. Some coals expand so much in heating that they can not be used alone. These coals are usually of the low volatile type used for mixing with high volatile coals in coke oven practice. They are never used in retort practice, as they are too low in volatile matter to produce a reasonable gas yield.

Specific Gravity of Lump Coal and Bulk Density are not of much importance in retort practice. Usually, charging is of such a nature that sufficient space is left between the top of the coal and the retort, regardless of the coal density. The latter is of more importance in coke oven practice, where a greater production of coke is obtained from higher density coals, in that heavier charges can be put in the ovens.

Typical Installation of Modern Bench "Tens" Charged and Discharged by Machinery.

Plasticity of Coal, when carbonized, is a natural occurrence in all gas coals, and the degree of plasticity will determine the amount of heat to carbonize completely. The plastic layer is an excellent heat insulater. The writer does not consider tests to determine plasticity of importance, as the heat required for carbonization can be determined more accurately during an actual plant test.

Storage and Weathering Properties of Coal are important in

COAL SELECTION CHART FOR

* — means of ordinary importance. ** — more than ordinary importance. *** — very essential. dash — means not important. blank — future development.

Uses			FACTORS IN COAL SELECTION (a)																	
			Classification							Specific Chemical Properties of Coal as Sampled										
			By Type (c)	By Rank (d)		By Grade				Moisture (%)	Ash (%)		Fusing Point of Ash °F (h)			Volatile Matter (%)	Fixed Carbon (%)	B.T.U. per Pound	Sulphur	
				Class	Group	Classification (e)	Size (f)	Impurities (g)	Deviation (f)	(h)	As Sampled (h)	Chemical Composition (j)	Initial Temperature	Softening Temperature	Fluid Temperature	(h)	(h)	(h)	As Sampled (%) (h)	Forms (k)
7. GAS MAKING (aa)	A. Coal Gas	(1) Horizontal Retort	**	**	**	**	*	**	***	*	**	*	*	**	*	***	**	**	***	—
		(2) Vertical Retort	**	***	***	**	**	**	**	*	**	*	*	**	*	***	**	**	***	*
	B. City Water Gas	(1) Bituminous	**	—	*	*	***	**	**	*	*	**	*	**	*	**	*	**	***	—
		(2) Anthracite	—	—	—	**	***	**	**	*	**	**	**	**	**	*	**	**	***	—
	C. Producer Gas (From Coal)	(1) Hot Raw	**	**	**	*	**	**	**	*	**	**	*	**	**	**	*	**	*	*
		(2) Clean	**	**	**	*	**	*	**	*	**	*	*	**	*	**	*	**	**	*

that almost every horizontal plant will require from three to six months' stock on hand at times. Threatened shortages from strikes at mines or by transportation crews, or possible radical increases in prices, make storage a necessity. Coal should not disintegrate abnormally or be subject to spontaneous combustion when kept in inventory for unusually lengthy periods. Actual observation of the coal under storage when these conditions prevail will best reveal objectionable features if they exist. It is unnecessary to state that a coal which ignites spontaneously under local conditions is not desirable, neither is a coal which loses too great a portion of its gas or coke making value when stored.

Breakage of Coal Through Handling is not a serious disadvantage in coals purchased for gas making in horizontal retorts. The largest size desired is about one inch lump, mixed thoroughly with fines. We do not consider a soft or friable coal objectionable if it possesses other superior gas making qualities. Soft coals reduce wear on handling machinery, especially crushers. Some extremely hard gas coals do much damage to this machinery and should be rejected because of the effect they have in increasing plant maintenance costs.

Grindability is Not Important since pulverization is not necessary in retort practice.

Coke Yield and By-Product Yield are very important in the selection of a gas coal. The writer believes that the economic value of these products is sufficiently important for a thorough discussion, in more detail, under a separate heading (Section 3), along with the B.T.U. in gas per pound of coal.

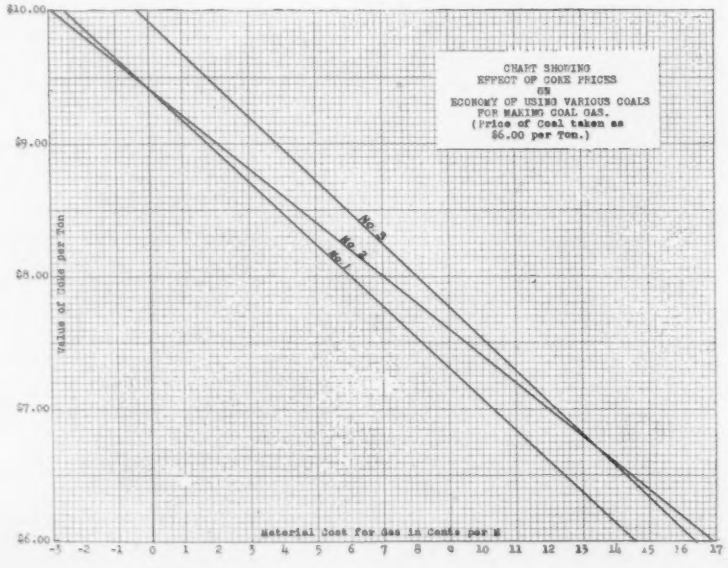
Quality of Coke, including such properties as apparent specific gravity, true gravity porosity, weight per cubic foot, shatter test and tumbler tests all have a very important bearing on coal selection, in the writer's opinion. These values can only be determined by a thorough and complete test of the coal for at least a week under actual plant conditions.

In selecting coals for use in horizontal retorts, actual plant tests are frequently advisable. When such plant test data are available for several coals and results indicate that each coal will produce good salable coke and a reasonable gas yield, the important question remains to be settled as to which is the most economical purchase. The method of reaching this conclusion is illustrated in the following problem:

Problem

Two coals are available for gas making which we shall designate as Coal No. 1 and Coal No. 2. Coal No. 1 has a heating value of 15,000 B.T.U. per pound, while Coal No. 2 had 14,500 heat units. The coals are to be used in a horizontal retort plant which must produce 2,000,000 Cu. Ft. of gas daily. To simplify the problem, we shall assume that each coal requires the same amount of fuel to carbonize it, and, on carbonization, produces the same amount of by-products, namely, 70% of combined coke and breeze, which we call coke, and 10.8 gallons of tar per ton of coal used. The prevailing local conditions net $7.00 per ton of coke sold and 5 cents per gallon of tar marketed.

First of all we check our heat



GAS AND COKE MAKING

Subcommittee (VI) to the technical committee on classification of coal under the sponsorship of the American Society for Testing Materials.

FACTORS IN COAL SELECTION (a)

	Specific Physical Properties of Coal as Sampled (kk)							General Characteristics						Coke and By-Products				Universal Limitations
	Caking Properties				Specific Gravity			Storage Properties		Handling Properties		Pulverizability	Potential Smoke Producing Properties					
Phosphorus (%)	Coke Button	Agglutinating Index	Expansion	Specific Volatile Index	Of Lump	Bulk Density	Plasticity	Spontaneous Combustion	Weathering	Size Stability	Friability	Grindability Index		Coke Yield	B.T.U. in Gas Per Lb. of Coal	By-Products	Apparent Specific Gravity	
(h)	(l)	(m)	(nn)	(o)	(p)	(q)	(r)	(s)	(t)	(u)	(v)	(w)	(x)	(y)	(y)	(y)	(z)	(yy)
—	•	••	••	••	—	—	•	•••	••	••	••	—	—	••	•••	•	••	
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—	•	•	•	—	—	—	•	•••	••	•	•	—	—	—	—	—	—	

balance to account for the B.T.U.s in the coal. In so doing, we assume that 4% of the coal is left in the retorts as carbon at 14,500 B.T.U. and that during carbonization, which is an endothermic reaction, 500 heat units are absorbed. Our heat balance of the two coals is then as in Table A:

Having accounted for our B.T.U. from each coal without any discrepancy appearing, we next set up a table showing the value of the by-products produced daily, in order to arrive at the coal material cost per unit volume of gas produced. For the sake of simplicity, we assume that either coal could be delivered in stock at $6.00 per ton. Our economic value of the two coals is as shown in Table B:

It will be noted that coal No. 1 makes gas for 10.3c per M., not including conversion charges, and that this coal, if purchased at the same price as No. 2, will make the required gas at $33.35 less cost per day and is therefore really worth 22.7 cents more per ton.

Coal No. 3 is shown in the tables below as a coal which has the same heating value as No. 2, but which produces less coke, 67% instead of 70%, and consequently more gas—3500 B.T.U. instead of 3100. Under the conditions existing, it is more expensive to use than Coal No. 1 or No. 2 and is actually worth 2.8c less per ton than Coal No. 2.

Since the quantity of coke and the price realized for coke or net coke credit are the two important factors in determining the cost of materials for gas production, it can be shown, by using other values than $7.00 for coke credit, that costs either increase or decrease. In this particular case, Coals No. 2 and No. 3 show no differences in economic value when the credit is $6.60. If higher coke credits exist, No. 2 Coal is the best purchase. Lower credits make No. 3 Coal more economical to use. If this credit increases to $9.47, the lower B.T.U. coal is equal in economic value to the higher B.T.U. Coal No. 1. Chart No. 1 illustrates this relationship between the value of the coals quite clearly.

It can be shown that the value and yields of other principal by-products, such as tar, also influence the gas cost, but to a much lesser extent.

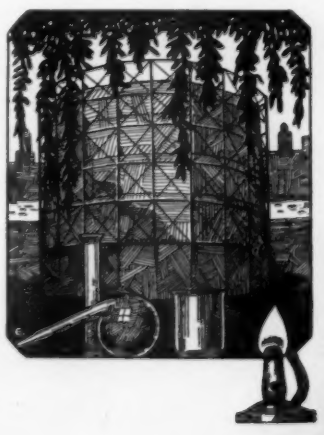
The determination of the actual value of any coal is very difficult to ascertain and requires considerable skill and experience. The foregoing problem illustrates briefly one method of arriving at a solution, which takes into consideration the value of B.T.U. in coal in the various forms of gas, coke and tar.

TABLE A

Products per Pound of Coal from	*Coal No. 1*	*Coal No. 2*	*Coal No. 3*
Coke—70% at 13,500 B.T.U./lb.	9450	9450	9050
Tar—.0054 gals. @ 161,000 B.T.U./gal.	870	870	870
Retort Carbon—40% @ 14,500 B.T.U./gal.	580	580	580
Heat of reaction during carbonization	500	500	500
Gas—Expressed as B.T.U. per pound of coal	3600	3100	3500
Total B.T.U. accounted for	15,000	14,500	14,500

TABLE B

Coal	*No. 1*	*No. 2*	*No. 3*
Gas Yield Cu. Ft./Lb.	6.79	5.85	6.60
Tons Required Daily	147.2	171.0	151.4
Coal Cost @ $6.00/ton	$883.20	$1026.00	$908.40
Coke Produced Daily—Tons	103.0	119.7	101.4
Coke Used Daily—Tons	17.6	20.5	18.1
Coke Available for Sale—Tons	85.4	99.2	83.3
Value of Coke @ $7.00	$597.80	$694.40	$583.10
Gals of Tar Daily	1590	1847	1635
Value of Tar	$79.50	$92.35	$81.75
Total Value of By-Products	$677.30	$786.75	$664.85
Coal Cost Less By-Products	$205.90	$239.25	$243.55
Coal Cost per MCF Gas Made	10.30c	11.96c	12.18c



Determination of the Swelling Properties of Coal During the Coking Process[1]

by

H. S. Auvil[2] and J. D. Davis[3]

COALS of low-volatile rank cannot be coked without admixing large proportions of high-volatile coal in the usual type of by-product-coke oven, because they expand excessively and exert side thrust, which ruins the oven walls. Some medium-volatile coals also give trouble. Since high-rank coals produce a strong, blocky coke, it is desirable to have the rank as high as practicable, particularly in the manufacture of foundry coke. Accordingly, it has become the practice to mix or blend high-volatile shrinking coals with as much low-volatile coal as possible and still have a mixture that will not deform the walls or cause difficulty in pushing the coke. Occasionally, the safe limit of low-volatile coal has been exceeded and ovens have been damaged. It is desirable, therefore, to have a reliable method of determining the expanding tendencies of mixtures before they are charged into the ovens. Furthermore, coal changes somewhat in its properties as mining progresses, and therefore, mixtures found to be safe at one time may cease to be so subsequently, particularly if nearly the maximum allowable percentage of low-volatile coal is being used.

When a sample of granular coking coal is heated as a whole under load at a uniform rate over the carbonizing range, the first appreciable change in volume observed is contraction over the temperature range of approximately 350° to 400°C. The mass becomes semifluid at the latter temperature, expands rapidly over the range of approximately from 400° to 500°C., and at or about 500°C. it sets to form coke. Qualitatively, a similar process must go on in a coke oven as the layers pass through corresponding temperature ranges.

On heating newly formed coke to full oven temperature, shrinkage amounting to about 25 per cent of its volume takes place, and the amount of shrinkage does not vary much for different coking coals. Data on this point will be given farther on in this paper. It may be concluded, therefore, that in the coking process expansion takes place only within the temperature range 400° to 500°C., or while the mass is plastic. On both sides of this range there is shrinkage only Koppers[1,2] states that the cause of expansion is the resistance of the plastic mass to escape of gases and vapors that are formed in the plastic mass, and that the higher the viscosity of the mass the greater the expansion.

Results are given for 10 coals, ranging from strongly expanding to strongly contracting, which have been tested in the sole-heated oven. The per cent expansion is given for the density of charge in each test and is also calculated to the standard density of 54.3 pounds per cubic foot. The widest variation of any result from the mean is 1.7 per cent, and this result was obtained with a strongly expanding coal.

In the case of two coals sufficient data were available to determine the slope of the expansion-charge density curve. Using this slope and the expansion at the test density, it is possible to calculate the expansion at the standard charge density. This method gave an average expansion of −17.5 per cent for coal and a −52 and of +16.2 per cent for coal XP-6, the average deviations being respectively, 0.3 and 0.7 per cent.

Satisfactory interpretation of test results can be realized only when they are correlated with the behavior of enough different coals in industrial carbonizing equipment. There is lack of knowledge as to what maximum charge density may be obtained industrially, and furthermore there appears to be no exact information as to what side-thrust oven walls will stand without injury. Koppers and Jenkner conclude, from results of experiments on the resistance to side thrust of a specially constructed oven wall, that a thrust of 0.1 kg./cm² (1.42 pounds per square inch) will ruin an oven wall. Koppers, in a later paper, uses a constant load of 0.08 kg./cm² in his test procedure for determining the practical expansion properties of coal. He reports results for the density of charge running as high as 56.2 pounds per cubic foot, and presumably he believes densities that high are obtainable. The Koppers method of determining resistance of coke-oven walls has been criticised, and no doubt ovens of different makes differ somewhat in the side thrust their walls will stand; however, so far as the writers know, his work constitutes the only attempt that has been made to measure this resistance directly.

Conclusions drawn from these tests are as follows:

1. The range and average of the heating rates in the plastic range in the test oven approximate those in the oven for which the test results are to be used.

2. The expansion-pressure relationships are very similar in the range of pressures in which the allowable thrust against a coke-oven wall must lie. It is indicated that a coal is safe which shows less expansion (or more contraction) in the test than a coal known from practice to be safe.

3. Expansion (or contraction) determined at a given test density can be calculated to the expansion to be obtained at any other density.

4. Per cent expansion is an inverse function of the logarithm of the load (constant) under which the coal is coked.

5. The highest actual charge density obtainable in an oven in practice should be used in the interpretation of test results, because the maximum thrust against the oven walls will occur at points of highest density.

6. Contraction of the charge in the preplastic range and of the coke are practically constant factors for different coking coals. The expanding properties of a coal are determined by its behavior while plastic.

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Use of Gas in the Foundry For the Baking of Cores

by
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IN a previous article* the use of gas in foundries was discussed and mention was made of the baking of cores, a most essential foundry process. It is now our purpose to enlarge that brief discussion, taking up the nature of the cores, the various types of ovens used for baking them, the firing of these ovens by gas, and data from representative installations.

Before turning to the nature of cores, it may be well to consider briefly typical moulding practice in foundries. Essentially this is the same for steel, iron, bronze, or aluminum castings. Moulding starts with a so-called flask—two steel shells rectangular in shape consisting of four sides without any top or bottom. The two parts are capable of being locked together. The lower half is called the drag; the top, the cope. At the start the drag is placed on a flat wooden base filled loosely with sand, and then the lower half of the pattern embedded in it flush with the upper surface. The pattern is a replica of the exterior shape of the desired casting (allowing for shrinkage), generally of wood, although it may be of metal. The cope is then placed over the drag, the two locked together, and moist green sand rammed tightly around the pattern, filling the cope completely. The top is leveled off, another flat wooden base placed on the cope, and the entire flask, cope and drag, reversed. The former loose sand of the drag is then tightly packed and the flask once again reversed. The cope and drag are then carefully separated and the pattern removed, leaving its imprint in the two halves of the flask. Any imperfections are corrected by the moulder; the cores are added; openings or gates are cut for the molten metal to flow into and through the flask; the cope and drag are assembled once more, and the metal is poured in. After sufficient time has elapsed for the metal to solidify, the casting is removed from the flask and is hammered to break up the cores. As a rule, it is sandblasted to clean it, after cutting off the gates and risers.

The purpose of a core is to create a hollow or void in a finished casting (neglecting for the moment the use of cores to replace parts of the mould itself such as cover cores or insert cores, or the strainer core sometimes used in the gate for the purpose its name implies). A core must be strong enough to withstand the abrasive action and the pressure of the molten metal and yet break up readily after the casting is formed, and pour out. It must be easy to shape at the start and yet strong enough to be handled readily when inserted in the mould. These demands are met by a mixture of green sand and a binder which is baked at a moderate temperature (350° F. to 500° F.) after shaping.

Types of Binders Used

Taking up the binders used for this purpose, we find that they fall into three general classifications as follows:—first and by far the most common, oil binders; second, water soluble binders; and third, pitch and rosin binders. Of the oil binders, raw linseed oil is the most generally used and altogether the most important material in the production of cores aside from the sand. Liquid at ordinary temperatures, linseed oil rapidly oxidizes at temperatures above 350° F. yielding a very strong core and one that is not affected by the dampness of the green sand mould in which it is eventually placed. Unfortunately linseed oil gives but little strength to the core before it is baked and for that reason is generally supplemented by one of the other types of binders. The water soluble binders consist of flour, glue, molasses, starch, dextrin, and similar substances that become sticky when wet. Pitch and rosin may be used in the finely powdered form mixed with the core sand or dissolved in heated linseed oil and then thinned.

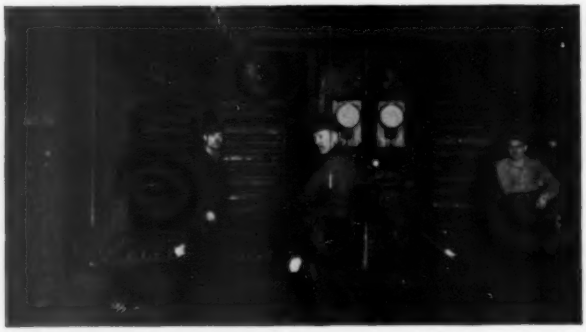
The proportion of binder to sand varies from foundry to foundry each having its own formula. Research at the University of Michigan under Professor H. L. Campbell as part of an American Gas Association Industrial Gas Research project indicated a maximum strength for oil-sand cores at approximately 2% linseed oil by volume and 4% water. Cores of this composition with a 1" x 1" section had a maximum strength when baked at 425° F. for 60 minutes (heating up of the oven requiring an additional 30 minutes). Cores of 1½" thickness took 75-90 minutes bake at this temperature; 2½", 120 minutes; and 3", 150 minutes.

Temperatures above 500° F. result in "burned" cores, or an actual destruction of the oil and a greatly diminished strength. Temperatures below 350° F. require so long a time to bake as to be impractical. Thus the conventional core oven temperature is 425-450° F.

To oxidize a pound of linseed oil requires approximately 4 pounds or roughly 50 cubic feet of air. Assuming a 2% by volume (1.17% by weight) mixture, then each 100 pounds of cores will require some 58 cubic feet of air for this purpose alone. This amount is small as compared to that necessary for the removal of the moisture in the cores and leads to our previous statement (AMERICAN GAS JOURNAL, July, 1938) that the baking of cores is virtually a drying process. In general

* *American Gas Journal, January, 1938.*

Battery of 16 rack type ovens of insulated panel construction. Each oven fired by two atmospheric multitube pipe burners shown entering just above the floor level. Racks handled by lift truck.



Two rack type ovens, brick construction, fired by lava tip burners using high pressure gas. Note monorail mechanisms for handling racks and recording temperature gauges.

practice ten to twenty air changes an hour are common in box-type ovens. Since this represents somewhere in the neighborhood of 100% excess air, the use of atmospheric burners with their known dependence on excess air for completeness of combustion is justified.

In the core room of the foundry the cores are made by hand or machine from the mixture of sand and binder using boxes of the proper size. (That applies to small cores. Cores may be many hundred pounds in weight and need reinforcement to hold together, which, of course, is another story.) The boxes are rammed tight and then inverted over plates, or aluminum "driers" used. These are loaded onto the shelves of the racks or placed on oven shelves, depending on oven design, and heated to the desired temperature for the proper length of time, the cross section of the core governing the time needed.

Oven Design

The ovens used for the baking of cores vary widely in size, shape and efficiency. They run all the way from the crude "night oven" to the modern travelling type. The "night oven" is simply a brick enclosure, generally lined with shelves, on which the cores are placed during the day. At night a coke fire is built on a grate in the rear and allowed to burn out during the night without further attention. In the morning the oven is opened and the cores removed, supposedly properly baked. On the other hand the travelling oven is a well made piece of machinery, handling smoothly tons of sand a day and giving every core a uniform and perfect bake.

Taking up the various kinds of stationary or box-type ovens, we find several broad classifications such as car, rack, drawer, and shelf ovens. Considering these in the reverse order, the shelf oven is the smallest, being used for small cores and low productions. Several shelves a few feet wide and but two to four feet deep are exposed on opening the door across the front. It may be made entirely of sheet metal, insulated or uninsulated, or perhaps it may be of brick construction. One or more drilled pipe burners take care of heating it. The entire oven suggests the conventional cabinet oven of the neighborhood baker and is as easily handled. The drawer oven, on the other hand, may be quite sizable with several drawers, one above the other, that pull out for loading or unloading the cores, much as the drawers of a filing cabinet. These drawers may vary in height so as to handle cores of different sizes which may be baked for periods of different length all at the same time. A sub-division of this type is the rotary oven, having shelves circular in shape, divided by a vertical partition down the middle of each shelf. One half of the shelf can be loaded while the other half is being baked.

The rack oven may be of any size and takes its name from the racks on which the cores are placed in the core room. The racks are generally made of angle iron frames built to handle several horizontal layers of core plates. These racks may have wheels, and be pushed into the oven; or they may be carried in on a platform truck or by means of a monorail. Most core ovens will be of this type.

The last type is the car oven differing only from the rack oven in that it handles cores so large that they are laid on a car that is pushed or rolled into the oven. Only a few cores will be handled at a time in an oven; and the baking period is generally several hours.

Oven Construction

Ovens may be built of firebrick, insulating brick, or by the use of insulating panels. For short, intermittent bakes the panel type represents a most sizable saving in fuel as its absorption of heat is but a fraction of that of the massive firebrick oven. For continuous 24-hour baking and very large cores, however, the brick oven is not entirely without merit, as the great mass of heat that it holds tends towards evenness of temperature throughout the oven and hence uniform baking conditions. Insulating firebrick, a development of recent years, likewise gives a considerable saving over ordinary firebrick, approaching the panel type in that respect. Most manufacturers use the panel type, exercising a great deal of ingenuity in the device that locks the panels together.

The travelling type are all of the panel construction, generally containing 4" of rockwool or similar insulating material. The shape and general design of such ovens will differ radically. The cores may be carried on racks hooked to an endless chain or laid on moving shelves. The travel may be entirely horizontal, vertical, or a combination of the two. The obvious advantage of the travelling oven is that every core is subjected to the same temperature conditions. Uniform heat distribution through a box type oven is sometimes a problem, but in a travelling oven each core travels the same path and is exposed to the same heating conditions. The main disadvantage is that the investment necessary limits their use to foundries with a very high production of cores of a comparatively uniform thickness thus calling for the same time-temperature cycle.

The Heating of Core Ovens

As indicated above, the heating of core ovens must be accompanied by the presence of excess air, and especial care must be taken to get good circulation. Core sand is a poor conductor of heat, and heavy masses are closely packed together, offering a considerable problem for the proper

movement of heat currents. The core and plate must be raised to temperature, and contained moisture evaporated and carried away, oxygen furnished for the linseed oil oxidation, and the pungent gases and smoke swept out. An excellent answer to all these requirements is furnished by the direct-fired air heater. The trend in core baking for a number of years has been definitely in the direction of the external heater discharging a large volume of air at the correct temperature uniformly throughout the oven. That is choice number one and is to be recommended wherever the budget permits. Its flexibility, its ease of control, but above all the opportunity it gives to bring the hot gases into the oven under pressure where needed make the air heater preeminent.

Three rack type core ovens, brick construction, heated by lava tip pipe burners firing horizontally across the oven under the racks. High pressure gas system.

Second choice is governed by local conditions. Ovens with high production schedules are often best served by means of blast tip burners as shown in two of the illustrations. Three or four inch pipe is drilled and tapped ½" on 2¼" to 3" spacing. Then a 1" x ½" or 1¼" x ½" street ell is inserted in each tapping and a lava tip of the desired size screwed into the street ell. Sometimes ½" close nipples and 1" x ½" reducers are used in place of the street ells. The burners are arranged to fire horizontally under the cars as a general rule, although the oven width and flue location decide. Gas-air mixture is supplied either by a low pressure system or by the high pressure system as described in an earlier article (American Gas Journal, March 1938). The plants shown in the two illustrations used gas at 20 pounds pressure to inspirate the required air, the inspirators and pressure gauges being plainly evident. High hourly gas consumptions and a positive pressure in the oven are advantages of this method of firing core ovens. Natural draft is not depended on and it is usually not difficult to get uniform heating.

Many ovens will, however, lend themselves to firing by means of atmospheric burners of the drilled pipe or multi-tube style. The battery of sixteen rack ovens shown in another of the illustrations is fired in this manner. Each oven has a multitube pipe burner with an atmospheric mixer along each side just above the floor level firing directly up. The advantage of the pipe burner is its low first cost and simplicity. Given specifications and furnished with the mixers by the industrial gas engineer, most foundries can make up their own burners in their machine shop at a nominal cost. Maintenance is negligible, consisting of an occasional cleaning out. Labor of the lowest class can easily learn the simple mechanics of operating the burners. Safety devices that may be required by the Underwriters are likewise simple, reasonable in cost, and easily applied. The big disadvantage is the occasional difficulty encountered in getting uniform baking. Natural draft directs the hot air currents, and the racks acting as baffles often offer considerable resistance to even heating. The bottom row of cores may be burned and the center still green, or what is still more common, the top rows are baked and the bottom stays green. Then is the time that the industrial engineer is on the firing line. Common sense is required and perhaps a little perseverance. Keep in mind that hot air rises and place the flues so as to pull the hot gases through the poorly heated part of the oven. That may mean venting the oven largely or entirely through flues centered in the floor of the oven. In our own practice we have found that it pays in large ovens to run two or three flues down each side of the oven nearly to the floor tied in at the top to the regular flues. Then if any part of the oven is not heating properly we merely cut into one of these flues (made of ordinary black flue pipe) near that location and actually pull the heat towards that spot. It is easy and speedy to experiment until the correct arrangement is found.

Calculations

The heat requirements for a core oven may be determined in a similar fashion to other industrial calculations as already given (American Gas Journal, May 1938) thus:—

Data given—Oven 7′ wide x 8′ deep x 7′ high.
Walls 4½" red brick.
Capacity One rack 5′ x 6′ weighing 1028 lbs. and holding 1280 pounds of cores with 220 pounds of aluminum driers.
Moisture content of cores 7%
Temperature of bake 475° F.
Time of bake 2 hours.

Calculations—

Sand (1.-.07) (1280) (.2) (475-50)	= 101,000
Water (.07) (1280) (1203)	= 108,000
Driers (220) (.22) (475-50)	= 20,600
Rack (1028) (55)	= 56,500
Total	= 286,100
Per hour	= 143,050 Btu.
Radiation loss 266 × 344	= 91,600
Grand Total	= 234,650 Btu.

Neglecting for the moment excess air, available heat of 900 Btu. gas at 475° F. is 730 Btu.

$\frac{234{,}650}{730}$ = 321 cubic feet of gas an hour

2 × 321 = 642 cubic feet per charge.

Oven volume is 392 cubic feet. Burning 321 cubic feet of gas per hour would give just under 8 air changes an hour. (One cubic foot of 900 Btu. gas yields 9.468 cubic feet products of combustion). 100% excess air would give app. 15 air changes. This excess air would require 21,300 Btu.'s to be heated to 475° F.

642 plus $\frac{21{,}300}{730}$ = 671 cubic feet per charge.

The above figures are so typical that we use a rule of thumb method for calculating the gas demand of core ovens as a general rule; namely, one cubic foot of gas an hour demand per cubic foot of oven volume (900 Btu.). In the above case we would use 392 cubic feet as against a calculated 336 cubic feet. In using this figure it should always be checked against the particular oven. Thus in this case the gas consumption at 392 cubic feet an hour would be 784 cubic feet for 1280 pounds of cores or 61.3 cubic feet per 100 pounds of cores, a reasonable figure. Should it work out below 50 or above 150 then the accurate calculation given above should be resorted to as a check.

Representative Installations

A. Conversion of Drawer type oven, coke-fired, to Rack type, gas-fired.

Coke-fired—7 drawer type ovens in battery, each oven 38″ wide x 6′ 11″ deep x 7′ high with 6 drawers. Fired from floor below through a vertical flue at one end of battery.

Gas-fired—Converted to gas making 7 rack ovens of same dimensions given above. Swing door made of 2″ of sil-o-cel C3 concrete for each oven. Flue located near front of each oven at floor level. Fired by 2 atmospheric multitube M2 x 72 pipe burners each placed in ducts along the sides of oven just beneath floor level.

Data:—	*Coke-fired*	*Gas-fired*
Duration of test	4 days	4 days
Ovens in use	7	1
Total time baking	33 hrs., 30 min.	27 hrs., 20 min.
No. cores baked	2,080	1,664
Wt. of cores, green	38,916 lbs.	8,301 lbs.
dry	36,537	7,860
Loss in weight	2,369	441
Per cent	6.1	5.3
Weight of plates	49,416 lbs.	12,360 lbs.
Steel-sand ratio	1.27	1.49
Fuel burned	9,120 lbs.	6,180 cu. ft.
Fuel per 100 lbs. cores green	23.4 lbs.	74.5 cu. ft.
Oven labor, man hours	32 hrs., 59 min.	2 hrs., 59 min.
Man hrs. per ton green cores	1.73	.723
Firing labor	43 hours	Negligible
Firing labor per ton cores	2.21	Negligible
Comparative costs per ton		
Fuel—Coke at $9.05	$2.12	
Gas at .60 per M., 900 B.t.u.		$0.894
Oven labor at .55	.952	.398
Firing labor at .65	1.438	0
Total per ton cores	$4.510	$1.292
B.t.u. replacement	4.53	1.

Remarks—An exceptional good case for gas showing advantage of individual firing of ovens as compared to battery firing.

B. Overnight Bake. Gas versus Oil.

Oil-fired—Oven 16′ 9″ long x 8′ 6″ wide x 7′ 2″ high.

Gas-fired—Converted to gas by means of 2—3″ pipe burners, 15′ flame length each with 61 #1 lava tips and a S.C. #56 inspirator using 900 Btu. gas at 10 lbs. pressure.

Data:—	*Oil-fired*	*Gas-fired*
Oven lighted	5:00 p.m.	6:00 p.m.
Oven turned off	1:30 a.m.	11:00 p.m.
Charge pulled	7:00 a.m.	7:00 a.m.
Lbs. of cores baked	6,100	5,369
Lbs. of steel heated	10,800	12,100
Ratio: Steel to sand	1.77	2.25
Temperature	350° F.	375° F.
Fuel used	94 gallons	6,332 cu. ft.
Fuel per 100 lbs. sand	1.54 gallons	118 cu. ft.
B.t.u. replacement	2.03	1.

C. Travelling Ovens. Gas versus Oil.

Oil-fired Oven 52′ long x 19′ high x 7′ wide heated by direct-fired oil heater.

Gas-fired oven 74′ long x 18′ high x 7′ wide heated by two direct-fired air heaters so located as to fire into two firebrick ducts located below and running the length of the oven. 900 Btu. gas.

Data:—	*Oil-fired*	*Gas-fired*
Duration of test	5 days	5 days
Fuel burned	120 hrs., 10 min.	120 hrs., 10 min.
Fuel consumption	1,944 gallons	250,900 cu. ft.
Cores baked, number	5,755	5,751
weight dry	292,800 lbs.	440,610 lbs.
Plates through oven, number	2,076	3,698
weight	622,800 lbs.	1,109,400 lbs.
Steel-sand ratio	2.12	2.48
Fuel per 100 lbs. cores	.663	56.9 cu. ft.
B.t.u. replacement	1.81	1.

Remarks—Note the high efficiency of the travelling ovens as compared to the stationary type.

Useful Data

1 cubic yard of cores weighs app. 2700 pounds.

Specific heat of sand is .195 Btu. per pound per °F.

Lacking accurate data, figure cores as containing 6% water.

A New Carbon Monoxide Detector

A new device for ascertaining the carbon monoxide content of any given air space has been perfected and will be made available to the public within a short time, the Engineering Department of The Travelers Insurance Company announces. Almost negligible in cost, and so simple that it can be constructed by anyone with slight mechanical knowledge, of materials obtainable from a hardware store and a drugstore, the device, it is believed, will be welcomed by many.

This method depends upon the conversion of carbon monoxide into carbon dioxide by combustion and the reaction of this carbon dioxide with an earth-alkali hydroxide, using phenolphthalein as an indicator. By means of an ordinary bicycle pump, the atmosphere to be tested is drawn through a filter, removing all carbon dioxide and hydrocarbons from the air. The carbon monoxide, remaining unchanged, is then converted to carbon dioxide by drawing it over an ordinary cigarette lighter coil. The product is then bubbled through the alkali solution. With the capacity of the pump known, it is only necessary to count the number of strokes until the color of the solution disappears. By referring to a table computed on the basis of carbon monoxide concentrations that are negligible, slightly harmful, and dangerous, with finer gradations between these divisions, the amount of carbon monoxide in the tested atmosphere is ascertained to a degree of accuracy sufficient for all practical purposes.

Editor's Note: This device should reveal the presence of any combustible gas containing carbon, not merely carbon monoxide. However, in the products of combustion from ordinary gas appliances carbon monoxide is the only combustible gas likely to be present in appreciable quantities.

Liability For Acts of Employes

Court Rulings That Determine When Employee May Make a Contract Which Binds His Company

by
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CONSIDERABLE controversy has arisen from time to time whether and under what circumstances a gas company is liable for agreements, contracts and promises made by employes.

It is a well known fact that employes are classified as either "general" or "special" agents. The courts have consistently held that a gas company is liable for all acts of its "general" agents, which are *relevant* to the employment. However, the company is responsible for *only* such acts that a special agent performs within the actual scope of the authority given him.

A review of past higher court cases disclosed an important rule by which it may be determined when a representative or employe may make a valid contract which binds his employer. He may do so only under the following circumstances.

(1) An employe can only make a valid contract for an employer when the contract is within the limit of the employe's authority. (2) Although persons dealing with an employe must inquire ordinarily as to the extent of the authority, this is not true when the employer sends the employe to perform an act with apparent broad authority. (3) When the authority to perform an act is given by an employer to an employe or representative the employe may do the work or service as he may deem best. (4) If the employe is a special representative and his authority is limited, and the employer has not in some manner notified the public of the employe's broad or unusual authority, then under no circumstances may the employe make a valid contract without first submitting the contract to his employer for approval. (5) Any employe, no matter how limited his authority may be, can have his authority greatly increased if the employer notifies the persons, with whom the employe intends doing business, of this increase of authority.

Whether clerks are special or general agents depends upon what authority has been given them. Generally speaking, a clerk employed to take applications for gas service is a general agent for whose agreements, contracts and promises the gas company is liable.

For illustration, in Oklahoma Natural Gas Co. v. Courtney 79 Pac. (2d) 235, reported June, 1938, it was disclosed that a person named Courtney notified a gas company to turn on gas in a house he had purchased. Courtney also informed a woman clerk in the gas company's office that he had not theretofore resided in the premises where he desired the gas to be turned on; that he knew nothing of the condition of the gas fixtures within and under the house; and that he requested employes of the gas company to inspect the gas meter, mains, pipes and fixtures leading to and upon the premises and to make suitable arrangements for the safe delivery of gas to the premises.

The employe of the gas company turned on the gas from the mains to the meter on the premises without making a test of the lines, and at that time there was an uncapped line under the house. After turning on the gas the employe came to the door and said, "The gas is on and everything is all right." Thereafter a plumber turned the valves at the meter and the gas flowed into the lines and escaped from the uncapped line under the house. An explosion followed and Courtney was injured. He sued the gas company to recover damages for the injury.

The important legal question was: Did the woman clerk in the gas company's office have sufficient authority to make a valid contract with Courtney, and if so was the gas company bound by the notification given by Courtney that he was unfamiliar with the premises, and was the company liable on the promise made by the clerk that the gas company employes would carefully inspect the lines, meter and apparatus before turning on the gas?

During the trial testimony was given which proved that Courtney went to the office of the Oklahoma Gas Company and there made a deposit for gas service to his house and there told the woman clerk that he would like to have them send somebody down to examine the pipes under the house and to examine the meter and to test it and that the clerk replied, "We do that; we have a man that we send down and see that everything is all right." And she called to Joe Gish, an employe, who was sitting in the room, and he said: "Yes, I will go down there and fix it."

In view of this testimony, the higher court held the gas company liable, and said:

"The record discloses that Miss Putman, a 'contract clerk,' was the agent of the company with unquestioned authority to bind the company to deliver gas and to order the physical work performed that was necessary to delivering gas. It is obvious that this employe had general power to do what was usual and necessary to carry on the business intrusted to her; and in furtherance of her employer's interest to make all such contracts as were reasonable and appropriate to that end."

With respect to whether the gas company was liable for negligence of Joe Gish, the employe who turned on the gas, the court said:

"Joe Gish (employe) was employed by the gas company to deliver gas to applicants for gas service. As one engaged in the occupation of distributing gas, he was required to exercise a degree of care commensurate with the dangerous character of the commodity which he was handling."

Also, in another case, Chicago v. Brazzell, 40 Okl. 460, in the fifth paragraph of the syllabus, the court said:

"A party guilty of negligence or omission of duty is responsible for all the consequences, which a prudent and experienced party, fully acquainted with all the circumstances which in fact exist, whether they

could have been ascertained by reasonable diligence or not, would have thought at the time of the negligence as reasonably possible to follow, if they had been suggested to his mind."

Things to Prove

In all suits for damages against gas companies three important things must be proved by the party who filed the suit. First it must be proved that negligence of the party who filed the suit did not cause the injury; second that the thing alleged to have caused the injury actually caused it; and third, that negligence of the gas company officials or employes resulted in the damage.

For illustration, in Freeport Sulphur Co. v. Portland Gas Light Co., 198 Atl. 606, reported May, 1938, it was shown that a gas company was charged with responsibility for a fire which destroyed a wharf and equipment valued at $271,877.53, freight cars with the contents valued at $17,-019.98, and sulphur valued at $46,-500.

The gas company manufactures gas and was charged with having permitted to escape into the harbor, from its premises, large quantities of oil, gas waste, and other materials of an inflammable nature, which became ignited on the water or flats under the wharf and destroyed the property in question.

The owners of the wharf and merchandise contend that the gas company's employes negligently and in violation of a municipal ordinance permitted oil and waste to be discharged into the harbor and that it became ignited and burned the wharf and merchandise, and that the company's officials knew, or in the exercise of reasonable care should have known that a fire might take place.

During the trial testimony was given which proved conclusively that the gas company's employes had permitted oil and tar to escape from its premises to the water. However, since it was not proved that the owner of the wharf was careful; that the gas company had permitted oil and tar to escape which contributed to the fire; and that negligence of the gas company's employes had started the fire, the higher court held the gas company not liable, and said:

"The plaintiffs (owners of the wharf) had the burden of proving in the first place their own due care, secondly, that oil, sludge, or tar on the water was a contributing cause of the fire, and, thirdly, that this oil, sludge, or tar escaped from the premises of the defendant (gas company) through negligence . . . There unquestionably was oil of some kind on the surface of the harbor on the day of the fire and that may have come from a number of different places. When we are forced into the realm of pure conjecture, there is nothing for a jury to consider."

In another case (125 Neb. 598), a gas company was sued for damages caused a home by a fire alleged to have been caused by gas leaking from a pipe. The higher court refused to hold the gas company liable, and said:

"It is possible that the fire may have been caused by a leak in the gas pipe, or by spontaneous combustion in the box of rubbish, or there might have occurred a slight explosion in the furnace, which threw out a flame which ignited some combustible substance, or it might have occurred in some entirely different manner. Proof is entirely lacking as to its exact cause."

"The company is not required to keep up a constant inspection, but when its attention is called to the trouble and it undertakes to remedy it, then this inspection, where there may be great danger, should be thorough and efficient."

Installation of Appliances

It is a well established law that gas companies are legally bound to exercise a high degree of care in selling gas and a failure to do so may render it liable. However, there is no absolute standard of duty, but the company employes should take every reasonable precaution.

The ordinary householder depends upon the experience that the gas company possesses and it is its duty, when selling gas to see that the appliances are fit and proper.

For instance, in Fonda v. Northwestern Public Service Co., 278 N. W. 836, reported May, 1938, a property owner sued a gas company for injuries alleged to have been caused by the negligence of the gas company employes in the installation, inspection and maintenance of a gas conversion burner in the property owner's heating plant.

The gas company admitted the purchase and installation, but claimed it was safe and proper, and that any injuries were caused by the property owner's negligence.

During the trial it was proved that the gas company was engaged in the installation and servicing of gas and heating equipment, and also in the selling, delivering and furnishing of natural gas therefor.

After company employes had installed the equipment, the property owner complained that there was a "funny odor". The superintendent sent an employe to examine the heating equipment. He opened the furnace front door, relit the pilot-light and left. The property owner testified that the house warmed up, but she later had a headache, pressing on her lungs, pictures on the wall seemed to dance around, felt she was going to faint, became sick to her stomach and nauseated. She further testified, when her father came to take her home, she was worse, delirious and hardly knew her father, and that she stayed in bed for sometime.

Although the lower court held the gas company not liable, the higher court reversed the verdict, stating important law as follows:

"Having undertaken this inspection, it was the duty of the appellees (gas company employes) to exercise ordinary care in making such inspection and to make any necessary repairs or advise the tenants or owner of the defects and afford an opportunity for them to make such repairs. The company is not required to keep up a constant inspection, but when its attention is called to the trouble and it undertakes to remedy it, then this inspection, where there may be great danger, should be thorough and efficient. Its liability in that case attaches the moment it assumes that the trouble has been remedied."

Asphyxiation Liability

Various courts have held that where gas companies' employes install and supervise equipment and furnish the gas for fuel, it is incumbent upon the company to see that the installation was proper and safe. Moreover, the company owes a further duty to make reasonable and necessary inspection as will enable it, in the exercise of ordinary care, to prevent injury or death to the patrons of its service, and for failure thereof the company would be liable.

For illustration, in Taylor v. Kings County Lighting Co., 286 N.Y.S. 36, a gas company was held liable for injuries sustained from partial asphyxiation by occupants of a home in which the company's employes had installed a gas heater and carelessly left a damper which became closed by vibration and interfered

with the outlet of carbon monoxide which permeated the home.

Also, the Supreme Court of Wyoming in the case of Miller v. New York Oil Co., 34 Wyo. 272, said:

"We must concede, as defendant contends, that it assumed no duty to inspect or maintain the heater, and that it was not liable as an insurer. Its duty was to exercise ordinary or due care in installing the heater, and the plaintiff was required to prove that the duty had not been performed . . . The defendant (gas company) in installing the heater, was required to take all reasonable precautions to guard against known dangers that would arise from ordinary use. It knew that the heater should be provided with proper and sufficient means for escape of fumes. By the testimony of its own witnesses, it is shown that the installation was defective if the vent pipe of the heater was connected with a clogged chimney."

Agent and Servant

The courts have ordinarily ignored the legal difference between an agent and a servant, and usually attempt to determine whether a person was a servant or ordinary agent on the one hand, or an independent contractor, or independent agent on the other hand.

The controlling or principal test is whether or not the gas company is liable for the acts of the employe. On the other hand, if the employe represents the gas company only *as to the results* to be accomplished and the gas company officials cannot directly control the employe then the latter is not an agent or a servant *but an independent contractor.*

Generally speaking, a servant is defined as a person employed to perform personal service for another, and who in respect to his movements or acts is subject to the other's control or right to control.

The important reason for being able to determine whether an employe is a servant or an independent contractor is that the gas company is liable for all acts performed by a servant within the scope of the employment, but the gas company is not liable for *any* acts of an independent contractor. Moreover, a gas company need not pay industrial or workmen's compensation insurance on an independent contractor. And if the latter performs injurious acts he personally is responsible and the gas company is relieved from liability.

For illustration, in one case a gas company employed a person to install new equipment. The company agreed to pay $5250 upon completion of the work which, as provided in the contract, must be performed in a first class manner. An employe of the person or subcontractor employed to install the equipment was injured and sued the gas company. However, the court held the latter not liable and explained that the independent contractor, who had employed the injured employe, was solely liable.

In another case a gas company contracted with a truck owner to transport merchandise for a stated sum. The truck owner negligently killed a pedestrian whose dependents sued the gas company. However, the higher court held the gas company not liable because he had no right to directly control the truck owner.

Gas Industry Officials to Inspect Progress of N. Y. World's Fair

Officers and members of the boards of directors of the American Gas Association, the Association of Gas Appliance and Equipment Manufacturers, and of Gas Exhibits, Inc., will participate in a tour of inspection of the New York 1939 World's Fair on Thursday, September 8th. The tour will follow a luncheon to be given at the Fair's Terrace Club by Gas Exhibits, Inc.

In addition to the utility executives and manufacturers represented on the various boards, officials of New York World's Fair 1939, Inc., and others devoting time and effort to the bringing about of the forthcoming Fair will be present at the luncheon and take part in the tour. Hugh H. Cuthrell, president of Gas Exhibits, Inc., will welcome the guests and will introduce the few speakers at the luncheon.

Because the gas industry and its fuel will play a predominating part at the Fair, it was considered desirable to give the industry's leaders an opportunity to see at first hand the extensive work being done at the Fair site. Already gas is being used for cooking and water heating in buildings operated by the Fair corporation. Miles of gas piping now extend below the surface to serve exhibitors' buildings and make possible the colorful gas displays which will be featured during the exposition.

Of great interest to those inspecting the Fair will be the progress being made on the construction of the gas industry's exhibit building whose main entranceway will be the spectacular "Court of Flame." As the group visits the numerous exhibition buildings, many of which are already completed, and as monumental works in various stages of erection are pointed out to them, it will be possible for them to visualize the magnitude of the 1939 World's Fair and the background it will offer for the promotion of gas as the modern fuel.

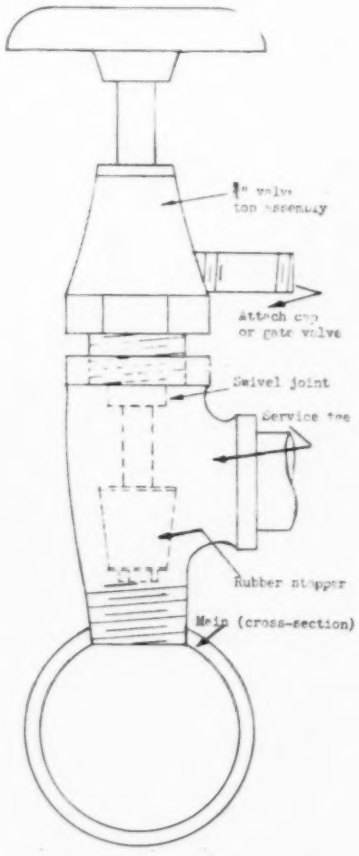
An Improved Service Stopper

By

Arthur L. Bennett

Hibbing, Minn.

The device consists of an upper valve body with a rubber stopper that is used to close off a gas service while make repairs on a leaking service. It is inserted in the usual service tee and can be left in an open position over night or at times when service must be maintained even though the repair crew has commenced work on the job.



The little gadget has proved to be very convenient in the company with which I am connected and represents a much more refined, dependable appliance than the usual stopper that must be removed and the tee plugged each time that service must be resumed or the service tested before backfilling the ditch.

Golden Gate Exposition Progress

Construction of exhibit palaces on Treasure Island for the 1939 Golden Gate International Exposition is six weeks ahead of schedule.

Pipe Corrosion & Coatings

Priming Procedure—Tar Base Enamels—Characteristics and Application—Quantities Required

Part 27

By Erick Larson

ANY thinned primer not used should be discarded, never returned to a storage drum or kept for application on subsequent days.

The thinner used should be as specified by the manufacturer of the priming material.

The potential disadvantage from excessive thinning of the primer is that when the hot coating material fuses into the primer the film may be so thin that fusion completely penetrates the primer and the effect is similar to an entire absence of a bonding material.

Storage of Primers

Primers dry partly by evaporation. Therefore storage of primers is necessarily in air tight containers. A good practice is to paint with primer around the sealing edge of each container lid when the primer must be stored over night or for longer periods. The primer will ordinarily provide an airtight seal of the lid.

The use of thiners in primers which have thickened is not good practice. The quantity of thinner necessary to return a thickened primer to its original state is a matter of judgment on the operator's part and usually an excessive amount is used. Again if such thinning is essential it should be done in the small application containers rather than in the storage drums. If thickening from atmospheric exposure has progressed so that more than ½ pint of thinner per gallon of primer is required, the primer should be discarded.

The drums should be kept in a reasonably cool and at least shaded place to prevent heat causing a slight distillation to occur and thus separate some of the ingredients of the primer.

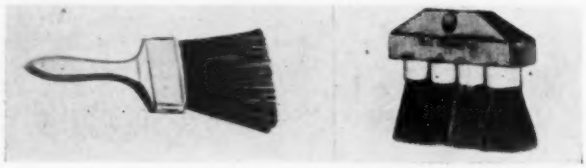
Any primer which has been stored in such a manner that water has collected on the surface should be discarded.

Application of Primer

The function of primer being that of a binding agent all methods of application are to secure that purpose in the most economical manner. A uniform coating of the surface with the primer is the first requisite and proper thickness is also of primary importance . Hand brushing has been found by experience to be the simplest and most effective method for producing the desired results.

Brushes For Applying Primers

A four-inch wide good quality hair paint brush with bristles four inches long set in a material which will not be affected by the primer will provide the best results. Soft bristles such as are found in the better grades of paint brushes are preferable to the stiffer roofing types. A long handle is sometimes connected to the brush to facilitate painting pipe on racks where each one cannot be brought within arms length of the painter. Extension handles also avoid the necessity for those applying the material to stoop over, thus speeding up the work.



Four inch Paint Brush . . . . . Four Knot Brush.

Stiffer bristled three- or four-knot roofing brushes are sometimes used. The large quantity of primer which these brushes can absorb increases the difficulty of securing a uniform prime coat. Where stiff brushes are used the surface should be gone over with a regular paint brush of the description already mentioned to smooth out the primer and remove bubbles. The primer should be carefully inspected to see that the excessive amount applied by roofing brushes does not settle to the bottom of the pipe and produce a ridge.

Rotary priming machines which are sometimes integral with cleaning units have fibre brushes. The adjustment of these brushes requires extra care to assure a thin uniform layer of the primer. Continuous inspection is required to assure maintenance of the adjustment of the rotary brushes. Particular inspection is required as a priming machine passes over welded joints as a slight angularity of the brushes may cause extra depositing of primers.

Spraying

Large diameter mains are sometimes sprayed when field primed. This method has also found more ex-

tensive use in mills and central stations for all sizes of pipe. Many factors such as the number, size and type of spray nozzles, method of maintaining a uniform distance between the surface and nozzles, the amount and uniformity of the air pressure, freedom of the air from moisture, speed of travel along the surface, absence of any particles in the primer which might stop up one or more of the nozzles and character of skill available effect the final result. Touching up with a brush is necessary when using the spray method to accomplish the important essential of uniformity. All of the above factors can not be adequately controlled and therefore the spraying method has not been generally adapted for pipe coating. A superior result is necessary in the application of a primer compared with ordinary painting. It will be found that a single application by the preferable method of hand brushing is usually more economical than the use of other more rapid methods which necessitate additional inspection and touching up. The application of a primer can not be compared with ordinary painting. Priming is a bonding agent while paint is in itself the protectant.

Hand and Machine Methods of Priming. 1—Preferred Priming Method; 2—Priming with Roofing Brushes; 3—Priming with Sprays; 4—Mechanical Priming.

Photos Courtesy The Barrett Co.

Carpet Slings

Application of primer by a carpet sling using either the "flip-flop" or "criss-cross" method is not satisfactory. The method applies entirely too thick a coat on most of the surface due to a lack of control. Considerable touching up is necessary and even then too thick a prime coat usually results. There is also more liability of foreign materials becoming mixed with the primer. There is more loss of material by this than most other methods.

Dipping

Dipping has generally been discarded as a method of applying primers which are to be the base for a pipe coating. The method is still common where the prime coat is the only coat such as on most cast iron pipe. The difficulty with the method has been the accumulation of excessive amounts on the bottom of the pipe due to run-off when the pipe has been immersed either horizontally or at a slight angle. When immersed vertically there is considerable difference between the quantity of primer on the high and low ends. Cooling of the primer occurs before the excess has completely run off, causing excessive thicknesses on the low end.

Progress of Priming

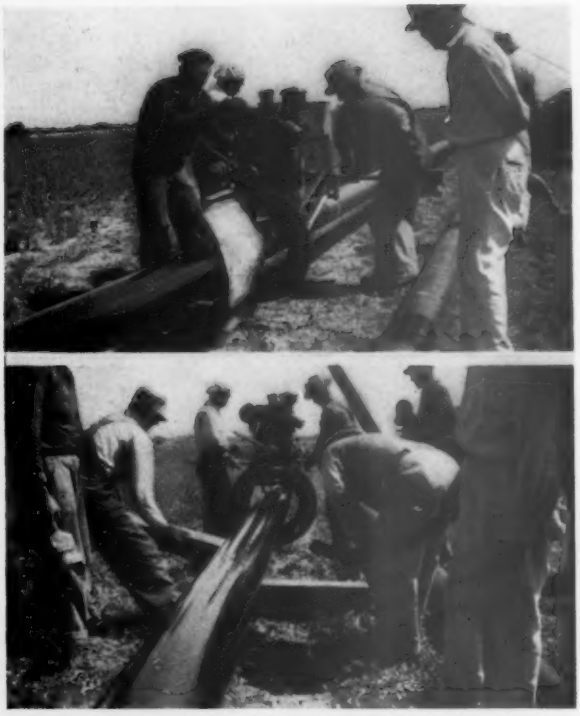
The rate of primer application is planned to conform to the speed with which the coating will be applied. The primer is applied to permit at least six hours drying, but not more than three days before the enamel is applied. The three days time is usually allowed only over week-ends or holidays on which work may be entirely suspended. The best practice is to prime one day and apply enamel on the following day.

Drying Time

Under normal atmospheric conditions, a primer which has been properly applied will dry sufficiently for the application of enamel in six hours. If heavy fog or rain occurs subsequent to priming a full day of drying should be allowed. Freezing weather does not ordinarily interfere with drying unless the humidity is high.

If primer has been applied and allowed to dry for more than three days it must be carefully examined and defective spots or the whole surface reprimed.

The heating of pipe, especially in mill priming practice, should be subject to the approval of the primer manufacturer. Some primers with a relatively brittle coal tar pitch base may not provide a suitable bond for the enamel if the drying time is forced by heating the



Upper: Mechanical priming; three men constitute a priming crew on this job.
Lower: Touching up with Hand Brushes.

pipe or exposing the pipe to unusually hot atmosphere.

The primer should cover the entire surface of the original prime coat when repriming is necessary. The heating of a primer and its hot application must be carefully controlled so that the temperature does not exceed 80° to 90° F. The purpose is usually to facilitate the spraying of the primer. Keeping the material in a warm place before application is effective, especially in cold weather, and may avoid the use of thinners. Such heating or warming of the primer will not decrease the drying time.

Manufacturers of some primers indicate that by mixing certain proportions of thinner with their priming material, the drying time for emergency purposes only may be limited to from 2 to 4 hours. This is not good practice, but is adopted by some companies when usual delay would seriously handicap the installation crew. The inspector should pass on every specific request from a contractor to shorten the drying time of the primer. A permanent record of such locations is essential for ascertaining the cause of coating failures. Rapid drying should be limited to touch-up priming and such specials as the final fitting or joint connecting separate strings.

Repriming

All pipe which was primed at the mill should be reprimed in the field. Primer which was applied in the field and allowed to remain without the enamel for more than the specified period may become dull in appearance, similar to that which was mill primed. Such primer should have an additional coat. When the primer has a dry flaky appearance, contains foreign matter, has been excessively applied and has flooded in certain spots, or when moisture has evidently penetrated into the primer, the original coat or coats should be removed down to the bare metal and the pipe immediately reprimed. The actual application of a second coat of primer is conducted in the same manner and with the same methods as specified for priming.

The reprime or second coat is applied slightly thinner than the original, although for estimating purposes it is good practice not to decrease the quantities more than 10%. No more than one reprime coat is used or the enamel may not melt through to the original coat.

Retouching

Retouching is priming those spots where the primer was scraped off or holidays occur. The same practices as for priming or repriming are followed.

Test For Dryness

The dryness of a primer is usually tested by sliding the hand over the surface under a moderate pressure. A properly dry primer will not slide or rub off. A slight tacky feeling does not mean the primer is insufficiently dry. Experience is necessary to determine the feel of a thoroughly dried primer as some have a soft tacky feel while others must have a hard surface. Primers usually dry sufficiently to allow handling of the pipe in from 45 minutes to an hour. The time of drying as specified by the manufacturer should be known and used as a check on the sense of feeling.

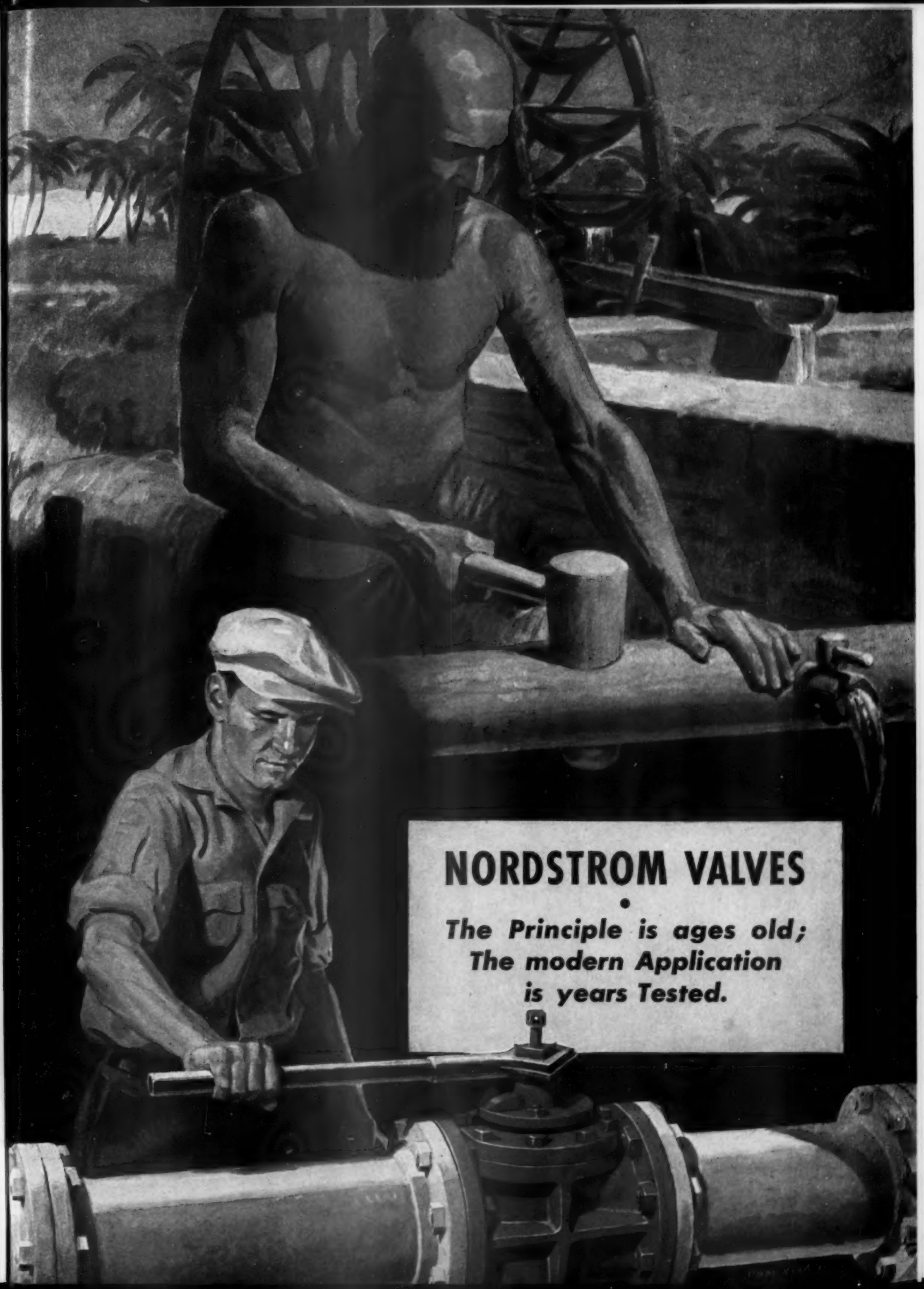
Some primers will dry dust free in two hours and completely dry in six hours. The use of any agents for the hastening of drying, other than thinners as specified, should be prohibited. The drying of a primer is usually conceived as an evaporation. While a slight amount of evaporation does occur, the process is actually one of oxidation. The primer increases in weight as the oxidation process continues. In a thick layer of primer the oxidation process is retarded or prevented by a thick surface film of oxidized material. Complete drying throughout the film is essential. The drying process works from the surface inward, as otherwise evaporative drying would keep the surface wet until drying was complete.

Photo courtesy The Barrett Company

Applying primer by brush method on 12 inch line. Note four men making application.

The shady side of the pipe is used to test for dryness as the drying action is ordinarily more rapid in the direct rays of the sun. If part of a line is in the shade and part in the sun, the shady section should guide the decision as to dryness. Sections hung over or near water, swampy sections or moist soils may require longer drying periods than other more favorable drying locations.

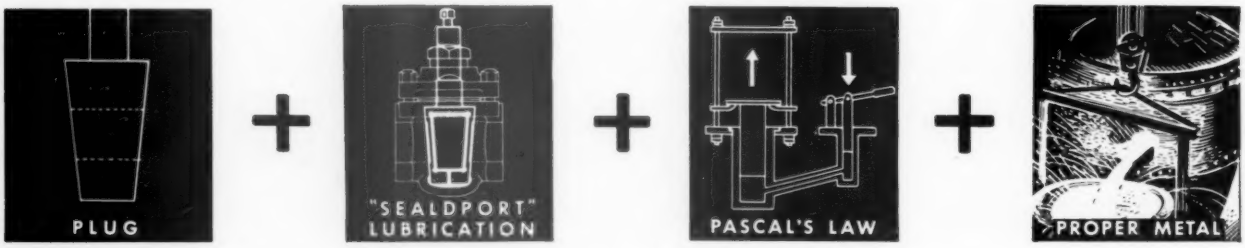
(Continued on page 29)


NORDSTROM VALVES
•
The Principle is ages old;
The modern Application
is years Tested.

The NORDSTROM VALVE PRINCIPLE

is as old as the hills;

ITS MODERN APPLICATION IS AS ADVANCED AS TOMORROW



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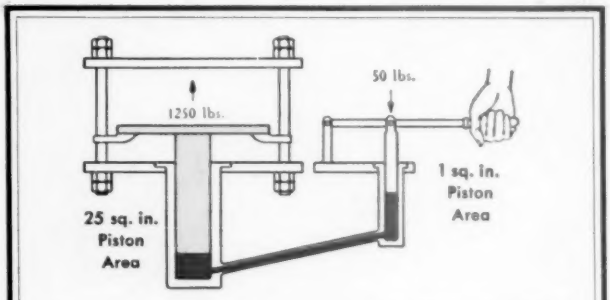
MADE IN A WIDE VARIETY of metals and alloys, Nordstrom Valves are desirable for special as well as general services. Special lubricants are provided.



PASCAL'S PRINCIPLE APPLIED TO NORDSTROMS

PASCAL'S LAW states: "*A unit pressure applied to the liquid contained in a sealed vessel is transmitted to every part of the liquid with undiminished force, thus multiplying the force many times.*" This principle is used in Nordstrom Valves—thus freeing the plug.

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QUARTER TURN
FULL FLOATING PLUG
NON-STICKING
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TEMPERATURES
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PRESSURES
Tested to 10,000 lbs.
Sizes ½" to 30"

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Weather Conditions Suitable For Priming

The preferable atmospheric condition for the application and drying of primer is clear, dry and warm. An impeding factor is humidity or the presence of moisture. If the humidity is such that moisture collects on the shady side of the metal, successful priming is impossible. Such an action in pipe line terminology would be "sweating." Priming outdoors is impractical in foggy, rainy and snowy weather. The observance of moisture on the pipe before application of the primer should be cause for discontinuance of priming. A requirement of speed in completion has frequently led to wiping moisture off of the pipe, but such is not good practice. A rapid installation has frequently been the cause of subsequent high repair and maintenance expense.

A difficulty in priming is that no numerical values of temperature and humidity can be established to designate suitable atmospheric conditions. Judgment and experience must determine the proper weather conditions, and therefore close supervision by the eventual line owner is essential.

The melting point of primers usually is between 110° and 150° F. Pipe exposed to the direct rays of the sun frequently attains a temperature between those limits. This condition must be carefully observed, or the primer placed on the hot pipe will melt and run off leaving an inadequate layer.

Drying Conditions

A free circulation of air is essential to proper drying. In mills or central stations the separators between layers of freshly primed pipe should provide at least one-inch of space, and an equal space should be maintained between adjacent pipe in each row. The stacking of pipe in more than a few tiers should be avoided.

Tier separaters should be as narrow as practical for the weight of pipe to be supported so as to avoid covering too large an area of the pipe. Retouching is necessary where the primer adheres to the spacers rather than to the metal. Wherever the primer has been scraped off, the pipe should be retouched and the new primer allowed adequate time to dry.

The freshly primed pipe should be handled carefully to avoid the scraping off of primer by slings, skids, etc. If pipe is handled by cranes, it is preferable to contrive a method of gripping which entirely avoids touching the primed surface.

Any dust which settles on a primer should be wiped off just before the enamel is applied. Use a hair brush or cloth from which the nap will not be removed by the tacky primer.

Any primer which has become even slightly covered with grease or oil should be removed, and the surface reprimed before the enamel is applied.

Cut-Back

Mill or central station coated plain end pipe frequently has an area on both ends free of enamel to facilitate joining successive pipes in the field. The term "cut-back" describes the practice of applying the enamel over the full length, then cutting the coating at the desired point and removing all between the cut and the pipe end.* Frequently the primer is not applied the full distance of the cut-back. It is a good practice to prime the full length so as to take advantage of the temporary protective value of the primer remaining after the enamel has been cut back. A better practice is to reprime the cut-back area after the enamel has been removed. When this repriming is the practice, the primer is originally applied at least one inch nearer the pipe ends than the cut-back on sizes up to and including 2", and for a distance of 2" on larger sizes. This assures a thorough prime coat under the enamel remaining after cutting back.

Screw joint pipe which is mill or central station coated should have neither primer nor coating applied to the threads, with the possible exception of some thin non-drying types of coatings such as petrolatums which do not become hardened even on the surface. On screw pipe a connector is sometimes used which covers the threads during the priming and coating process. Otherwise a layer of paper may be wrapped over the threads or the exposed section of the threads.

Priming Joints

Priming is necessary on field connections after the joining of pipe has been completed. The primer is applied to all parts of joints at such a time. Care is exercised not to apply excessive amounts of primer on the threads remaining exposed in screw joints.

Slip and mechanical joints which have exposed bolts are difficult to prime with an even smooth layer of the primer. When such difficulty is encountered, the primer may be applied more uniformly if one pint of thinner is added to each gallon of primer in warm weather and one quart during cold weather.

The brushing of joints should be more vigorous than on smooth surfaces and less primer should be taken on the brush when it is dipped so as to avoid flooding at individual points.

Priming Equipment

All types of equipment used for storing, conveying or applying primers, such as drums, paint cans, brushes, spraying apparatus, mechanical applicators, etc. must be kept free from dirt, moisture or any foreign material. The containers used for conveying or storing primers must not be used to convey other liquids such as water, kerosene, lubricants, greases, gasoline, or for storing tools or other materials.

Brushes should be discarded before becoming so worn that a uniform coat can not be spread. The use of full brushes saves time by minimizing the frequency with which they must be dipped into the primer.

The brushes should be cleaned before leaving for any period of time such as overnight. The cleaning fluid for this purpose may be any of those recommended for cleaning oils and greases from surfaces to be primed. Placing the brushes in an open can of primer overnight to avoid cleaning is not good practice. The primer so exposed should not be used. The brushes should not be stored in water, kerosene, linseed oil or similar liquids, as is the custom in ordinary house painting.

If it can be arranged to immerse the brushes in the primer and at the same time keep the container sealed, the brushes will remain pliable. Even when this practice is followed, it is advisable to clean the brushes before immersion.

Inspection

Immediately following the priming operation, the primer is inspected and voids or holidays are covered. An excess of primer where the retouching overlaps with the original primed section should be avoided.

Where the primer has been excessively applied or where foreign matter has become mixed with it, the primer should be removed down to clean bare metal.

It is sometimes found that the primer does not dry. This may be particularly true over localized areas. The cause may be mixture with oils or greases. Such un-

* *See foot note on following page.*

dried areas should be removed down to the bare metal and the pipe reprimed. The usual drying time is necessary for the section thus primed.

An inspection is necessary after the primer has dried to detect places where holidays exist. Holidays are caused by walking on the pipe, dragging lines or other objects across the pipe, moving the pipe on the skids and other such avoidable actions.

Tar Base Enamels

History

Pitch, a coal tar derivative, extensively used as a protection against sub-surface and atmospheric corrosion and as a water-proofing agent, was discovered in 1681. The commercial use of pitch as a pipe line protective was reported by Angus Smith as early as 1840. Kirkwood reported in 1858 the use of a refined coal-tar pitch mixed with 6-8 percent raw linseed oil. F. N. Speller in his book "Corrosion" also mentions that pipes were sometimes preheated and dipped in the oil-tar mix when both were at 300° F. After submersion for 15-30 minutes the pipe was withdrawn and allowed to dry.

The first important use of a tar base enamel for the protection of a gas line occurred in 1926 at Glassboro, N. J. Rapid development and expansion in the use of this material took place between 1926 and 1930. Since then, tar base enamels have continued to gain in popularity as experience has tended to confirm the success of the early experiments.

Definition

Coal tar enamels are combinations of coal-tar pitches and binders or fillers. Pitches are bitumens derived from the distillation of coal tar. The coal tar may be that produced by either the coal or water gas process of gas manufacture.

"Cut-back" is a term frequently used in pipe protection.* Cut-backs are bitumens dissolved in light petroleum distillates or coal tar solvents. The consistency may vary from a fluid which readily runs at normal temperatures to a hard putty. Cut-backs of either asphalt, or tar bases are frequently called paints coupling compounds or mastics. Coupling compounds and mastics were described under "Asphalt Enamels." The same general descriptions may be used for tar base products. While tar products are generally conceded to have more advantages as water-proofing agents than asphalt base products, tar paints, mastics or coupling compounds have not been as successful for sub-surface protection as enamels. Evaporation of the solvent used to cut back these latter materials leaves a comparatively soft coating which is rapidly deteriorated from a corrosion protection viewpoint by the physical forces encountered after burial

Ease of Application

Tar base enamels, like asphalt enamels are more expensive than paints, cut-backs or emulsions. The degree of skill required for application is available in any pipe laying gang, and no previous experience is required.

Physical Resistance

The ability of a tar base enamel to resist the physical forces to which it may be subjected previous to burial

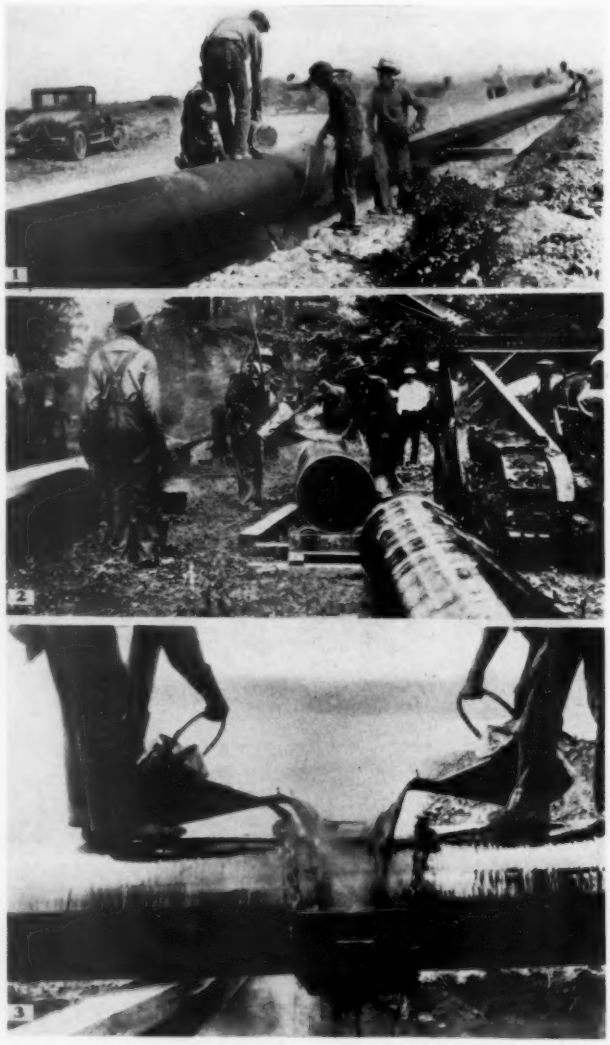


Photo courtesy Wailes Dove-Hermiston Corp.

(1) Applying bituminous enamel over Osnaburg wrap. (2) Applying bituminous enamel with rolling rig on 22 inch pipe line. Enameled pipe in foreground. (3) Enameling coupling on Detroit Gas Line.

is equal to that of asphalt enamels. The same resistance to physical forces is found in both when the melting points are similar. Both types lack ability to resist soil stress completely regardless of the hardness.

Temperature Effects

High temperatures ordinarily will not cause tar base enamels to soften and flow as quickly as an equivalent asphalt base enamel. The flow point of the tar base enamels is usually nearer to the melting point than with an equivalent melting point asphalt base enamel. Otherwise tar base enamels have the same general characteristics with respect to temperature as were given when the requirements of coatings were being considered.

Bond

Producing a proper bond depends upon the same factors as were mentioned in connection with asphalt enamels. Bond is sometimes evaluated by the tensile strength of the coating. Both asphalt and tar base enamels have been tested and found to have a tensile strength in excess of 900 pounds per square inch at

(Continued on page 46)

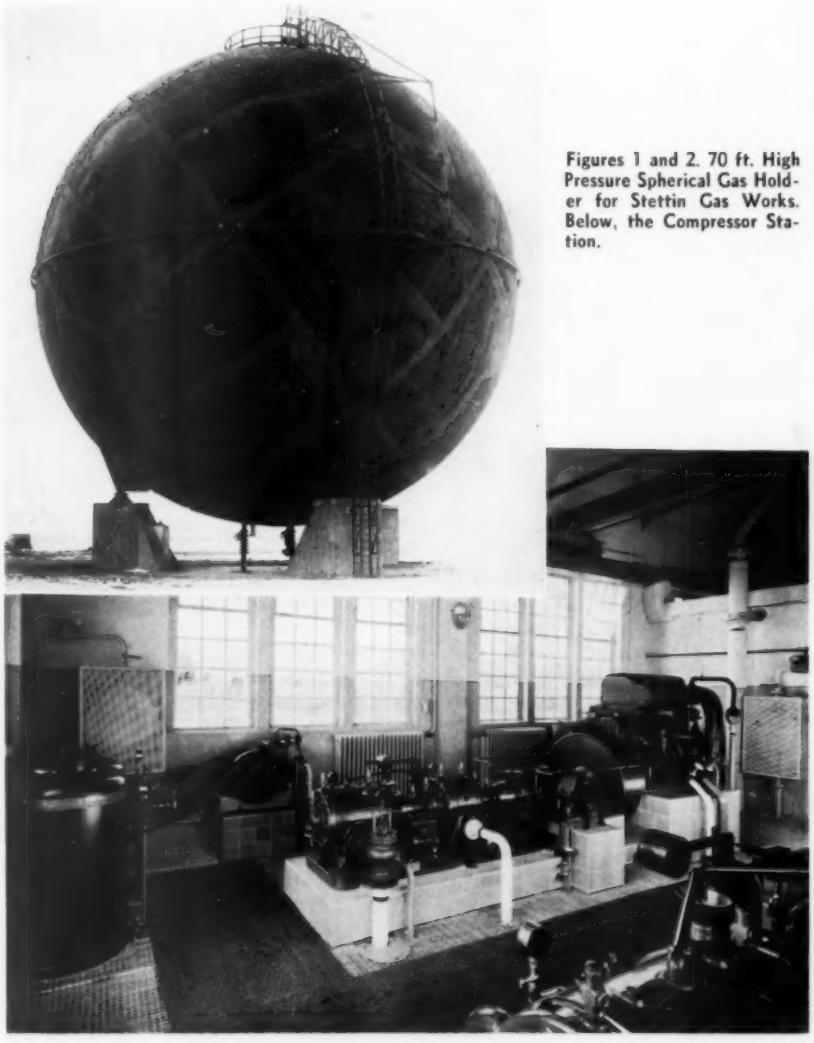
** The term "cut-back" is used in connection with pipe coating with the following two different meanings: (1) Cutting and removing the coating material near the pipe ends in order to permit joining, and (2) bitumens dissolved in light petroleum distillates.*

Use of the Spherical Gas Holder in Germany

Globes Built for High Pressure Storage Standby in Emergency

by
A. J. G. Smith

THE unsettled political situation in many European States has resulted in a number of developments of interest to the gas industry. Among the innovations of the last few years is the spherical type of high-pressure gas holder which is coming into use in many German cities in connection with defense precautions, in order to ensure that a reserve supply of gas shall always be available in case of severe damage to the main undertaking. Most of these spherical holders were originally installed in the western part of the country which is considered the most vulnerable, and were of comparatively small size, but the photograph reproduced in Fig. 1 shows a holder which is considerably larger than anything hitherto attempted of this type. Erected last year for the Stettin Gas Company, it has a diameter of 70 feet, a capacity of some 883,000 cubic feet of gas, and it is suitable for a working pressure of 72 lb. per square inch.



Figures 1 and 2. 70 ft. High Pressure Spherical Gas Holder for Stettin Gas Works. Below, the Compressor Station.

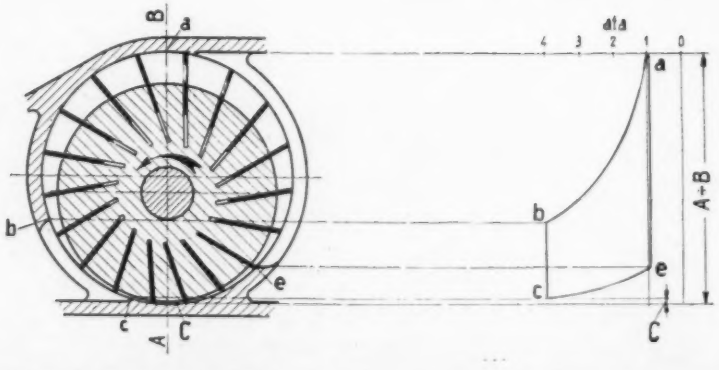


Figure 3. Cross section and working diagram of a one-stage rotary compressor. e. Completion of expansion of air remaining in space C, and commencement of expansion. a. End of suction. c. End of air delivery. b. End of compression.

The compressor plant installed in connection with this holder is shown by the photograph reproduced in Fig. 2. This plant consists of two rotary compressors of the 2-stage water-cooled type direct-coupled to town gas engines, the first unit having a capacity of 20,000 cubic feet per hour at a speed of 980 r.p.m., and the larger one 42,000 cubic feet per hour at 735 r.p.m. The working pressure is 75 lb. per square inch.

The type of machine generally used for these high-pressure installations is shown by the sectional cut in Fig. 3. It will be seen from this that a rotary drum mounted on a shaft running in roller bearings is

located eccentrically in the rotary casing of the compressor in such manner as to provide a crescent-shaped working chamber, which latter is divided into a number of cells by blades sliding freely in slots provided in the rotary drum. The air or gas entering the intake at "e" fills these cells, each of which is automatically shut off from the intake as soon as it arrives at the point "a". From "a" onwards, the air or gas is compressed in consequence of the diminishing size of the cell due to the rotation of the drum, until the compressed charge is finally discharged at "b". This type of machine runs at a comparatively high speed, and its working principle ensures a particularly uniform turning movement, with practically no vibration.

This Stettin installation may be taken as typical of the manner in which many European gas undertakings are endeavorlng to provide against some of the risks resulting to vital public utility undertakings from an unsettled world.

Metropolitan Gas Heating and Air Conditioning Council

The opening Fall meeting of Metropolitan Gas Heating and Air Conditioning Council was scheduled for September 7th. The Council includes in its roster eighteen gas companies in the New York metropolitan area and nearby cities as well as American Gas Association representatives. Herbert G. Schaul is Chairman and Otis E. Barene of New York & Richmond Gas Company is Secretary-Treasurer. Headquarters of the Council are at 420 Lexington Ave., New York.

Dig Your Next Trench Job
with
"CLEVELANDS"
YOU SAVE MORE
***Because* YOU DO MORE**

Your next job may be a gruelling main line trench through rough, stony country, in loose sand or sticky gumbo, or it may be a distribution trench in the close confined areas of city or suburbs where you are beset by many obstacles, such as vehicular traffic, curbs, poles, trees, shrubbery, fences, conduits, cables, fine lawns, sidewalks, etc.

No matter where the work or what the conditions, you'll find Clevelands will deliver maximum performance for they are built to meet today's conditions. Available in several models including the now famous Baby Digger.

From their husky Diesel or Gasoline powered engine, to the improved high capacity digging wheel, you'll find toughness, freedom from friction and protection against wear, to an unrivalled degree, in these compact—flexible, mobile Cleveland Trenchers. They are strong and dependable with a notable lack of deadweight and unnecessary bulk.

Let us demonstrate and prove to you on your next job, without obligation, that you'll save more and do more with Clevelands. Write today.

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THE CLEVELAND TRENCHER COMPANY
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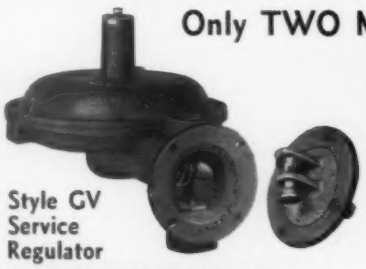
CRUSE-KEMPER COMPANY
STEEL PLATE CONSTRUCTION
AMBLER, PA.
GAS HOLDERS
HOLDER INSPECTION
RIVETED OR WELDED FABRICATION & ERECTION
TANKS, BINS, FLUES PURIFIERS, WELDINGS

Only TWO Moving Parts



with single unit double-guided valve to insure perfect seating. Renewable streamline soft seat gives increased capacity. An outstanding Connelly design, unequalled in simplicity and economy of maintenance. Weight or spring loaded. Ask for Bulletin No. 200-B-1.

Style GV Service Regulator

CONNELLY
IRON SPONGE & GOVERNOR CO.
Chicago, Ill. Elizabeth, N. J.

THERE'S A REASON

WHEN 15,000,000 WOMEN COOK WITH *Gas*

IT'S BECAUSE The new gas ranges like the MAGIC CHEF are far ahead of the standards of only a few years ago. Styled by famous designers, engineered and developed to meet present day requirements according to the definite opinion of today's homemakers — cooking is automatic, easier — more economical and food retains its natural goodness.

LOOK FOR THESE FEATURES WHEN YOU BUY A RANGE

NEW TYPE COOKING TOPS — designed for greater working and cooking surfaces — they come in two styes, one with burners in the center and one where they are divided.

BAKING OVENS with the new "V" type burners and the famous "Red Wheel" control, operate faster — conserving both time and gas — insuring perfect results. The ovens are insulated to provide low cooking temperatures necessary for certain types of whole meal cookery, slow baking and canning.

SWING-OUT BROILER. The new convenient type broiler with independent burner that enables you to stand comfortably erect includes a new smokeless broiler pan and grid which may be washed like a dish. This broiler is adequately ventilated by a special system to carry off the hot fumes, provide kitchen coolness and cleanliness — for you broil with the door closed.

NON-CLOG TOP BURNERS provide a thousand heat adjustments — burners that do not clog from spill-overs — easy to clean — adapted for all kinds of surface cooking.

EASY TO CLEAN from inside to out. These new ranges are easy to clean, burner trays, broiler trays and grids and oven bottoms are all designed for quick cleaning — oven racks may be pulled partly out without tilting. You'll marvel at this practicable Modern Range with its many features for convenient operation, speedy and low-cost cooking. See the new models at our store — there's a style and price to suit you.

DOWN PAYMENTS AS LOW AS $4.00

18 MONTHS TO PAY 18

LIBERAL OLD STOVE ALLOWANCE

The Modern Gas Range Costs Less to Buy — Less to Use

GAS THE LOW COST FUEL

• ILLINOIS IOWA POWER COMPANY •

An Advertising Headline with Effective Appeal

Sales Plan Book On CP Ranges Mailed by A. G. A. E. M.

The marketing of the new CP gas ranges, by eighteen manufacturers to the public through utility companies and dealers throughout the United States will be presented in an extensive and co-ordinated promotional drive under the auspices of the Domestic Gas Range Division of the Association of Gas Appliance and Equipment Manufacturers. This educational and sales program has received the encouragement and backing of leaders in every branch of the industry.

A complete and stimulating Sales Plan Book containing suggestions for the advertising and merchandising of this "crowning achievement of the gas industry" has been mailed to sales managers of gas companies and manufacturers. A request has been made that any sales manager who has not received his plan book communicate with the Association.

Interest-compelling titles introduce pages giving the background, points of exceptional merit and sales revolutionizing angles of the new ranges. It emphasizes that the CP ranges cost no more than ordinary ranges because of the "3 super-savings"—namely, "improved convenience saves time, improved efficiency saves fuel, improved performance saves food."

cp

This sales plan book vividly portrays what the placing on the market of the new CP ranges will mean to the utility and the dealer as far as substantially increased sales are concerned, and how homemakers throughout the country will realize in gas the most efficient and economical cooking fuel.

The sales plan book includes various tested promotional pieces each in separate pockets and easily removable. Suggested newspaper advertisements, direct mail pieces, window and floor displays, attractive bill enclosures, publicity releases, "spot" radio announcements, and other miscellaneous items for creative sales promotion are all to be found in the book.

It also contains twenty valuable suggestions for effective dealer co-operation and sales tie-in material adaptable for the dealer's usage.

The A.G.A.E.M. address is 60 East 42nd St., New York.

Black Box, N. Y.

NOT FOR A COAL SHOVEL

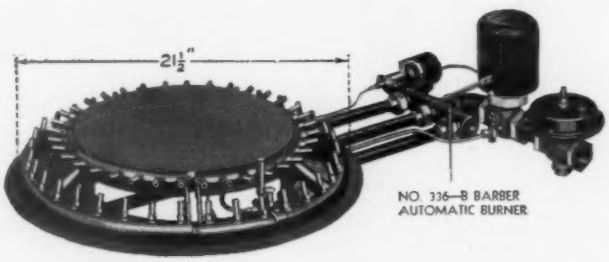
Beautiful hands—any woman feels proud to have them. But firing an ordinary solid-fuel furnace is certainly no help to milady's hands. It takes more than a manicurist to lick the coal shovel. It takes GAS.

Equipment for automatic gas heat can, and should, be sold not only on the basis of comfort and economy–but as a method of freeing American housewives from antique drudgery. Show your feminine customers how easily they can heat with gas and use the *furnace or boiler now in the house.* Barber Conversion Burners will increase your sales to *satisfied* customers.

●

The "B" Model shown comes in 8 sizes for round grates 12" to 34" in diameter. There is also a wide range of sizes for oblong grates. Patented BARBER Jets insure complete combustion, with a "scrubbing" flame action on walls of firebox. No fire brick or refractory elements needed. Baltimore Safety Pilot. Listed in A.G.A. Directory of Approved Appliances. Ask for Catalog and Price List on Conversion Burners for Furnaces and Boilers, Burner Units for Gas Appliances, and Gas Pressure Regulators. We supply sales folders, at your request, for mailing to your customers.

●



THE BARBER GAS BURNER CO., 3704 Superior Ave., Cleveland, Ohio

Address Michigan Inquiries to The Barber Gas Burner Co. of Michigan, 4475 Cass Ave., Detroit

BARBER *Automatic* JET GAS BURNERS

Gas For All Four

Milwaukee Apartment Project Helps to Make Citizens "Gas Conscious"

By

John E. Hubel

IF Milwaukee householders are not becoming more "gas conscious" it is not the fault of the local gas utility or the owners of Story Hill houses, which are termed Milwaukee's newest and most modern apartment project. These houses are privately built and owned and there are now four of them, all fully equipped for the use of gas for heating, cooking, refrigeration and hot water heating.

When the first units were opened to the public, the gas company ran a large advertisement in the newspapers of Milwaukee, calling attention to the use of gas in these buildings, with the following headlines:

"They Heat with Gas; They Cook with Gas; They Refrigerate with Gas; They Heat Water with Gas."

The advertisement went on to explain that 100 per cent gas heating was used in the houses or apartments, so that rentals could pay a profit. It declared that with gas the fuel cost is low and installation cost averaging about $100 less than for other forms of automatic heat. The equipment, the ad stated, lasts longer when gas fired, with much less expense for service, as it has no moving parts.

All of the apartments in the Story Hill houses are equipped with Roper gas ranges (unless the tenant when moving in already has a gas range). These Roper ranges being installed for the tenants are equipped with heavily insulated ovens, roll-out broilers, automatic top lighting, oven heat control and all the other new features with which the modern gas stove is now equipped.

For refrigeration in these apartments the Electrolux gas refrigerators are installed (except for tenants who already have refrigerators when they move into these apartments.)

With these facilities, the gas company claims in its advertisement covering the Story Hill houses, the apartments are made All-Gas homes.

The apartments are heated by Meuller gas-fired furnaces, the cost of the heat being included in the rent, as well as the hot water, the latter being furnished from a central source by means of a Bryant gas heater in the basement of the building, with which the utility claims to make it possible to heat 600 gallons of water with $1.00 worth of gas at the rates in effect in Milwaukee territory, the first step in the gas rates being $0.75 per thousand cubic feet. The fuel supply for each apartment building is obtained from one gas header which runs the length of each apartment building.

This Story Hill Apartment House in Milkaukee uses gas for all four services. The inserts below show range, refrigerator, central water heating equipment, and gas fired furnace equipment.

Although the rentals for apartments—$55.50 for two-bedroom and $65.50 for three-bedroom suites—a deposit and monthly charge is added for certain equipment, as some tenants when moving in have their own refrigerator or range, and some do not desire to pay extra for shower baths. These additional rates are as follows:

	Deposit	Monthly charge
Gas range	$4.25	$ .70
Gas refrigerator	8.85	1.50
Shower	4.25	.70

If the tenant remains in the building for five years, the deposit is returned and the monthly charge is discontinued. These extra charges, the owners state, are given at cost, without profit.

Interviews with the tenants of the apartments indicate that all are satisfied with the gas appliances which were practically forced on them. The gas refrigerators, they state, are especially satisfactory, as they are free from moving parts and there is no noise in operation. So far as is known, no "out of order" reports have been received by the management of the apartments so far as the gas appliances are concerned.

So popular are these Story Hill apartments that there is usually a waiting list of prospective tenants. Many are relatives or friends of present tenants, who, having boasted of the satisfactory operation of the gas equipment and the service rendered, that others would like to live in apartments so well supplied with conveniences at reasonable rates.

There's a Reynolds Regulator for every Gas Control Requirement

For nearly half a century REYNOLDS Gas Regulators have proved their ability in a field outstanding for its rigid requirements.

Proper regulation at the station, in the line, in industrial plants, in the home—for every kind and type of pressure control equipment used in the gas industry, there is an especially designed product by REYNOLDS that will give satisfactory control limits, capacity range and economical operation over a long period of time.

REYNOLDS PRODUCTS

- High Pressure Service House Regulators
  Straight Lever Type—Models 0-10-20 Series
  Toggle Lever Type—Model 30 Series
- Low Pressure Service or Appliance Regulators
- District Station Regulators
  Single or Double Valve, Auxiliary Bowl and Automatic Leading Device Optional
- High Pressure Line Regulators
  Pilot-Loaded, Pilot Controlled
- Toggle Type Regulators
  Single Valve, Double Valve, Triple Outlet
- Seals
  Dead Weight or Mercury
- Relief Valves
  High or Low Pressure
- Back Pressure Valves
- Automatic Quick Closing Anti-Vacuum Valves
- Automatic Shut-Off Valves
- Lever Operated Valves
- Louver Operated Device
- Atmospheric Regulators
- Vacuum Regulators

REYNOLDS GAS REGULATOR CO.
Anderson, Indiana, U. S. A.

Gas Control Since 1892

The formula is very simple. Merely feature Payne gas-fired Floor Furnaces —one of the fastest selling heating units in America today. • There's reason aplenty for the tremendous popularity of the Payne Floor Furnace. It is the most efficient and economical floor furnace ever built. • But Payne hasn't let matters rest there. • This year Payne is backing its products with the greatest consumer advertising program in Payne history. • Payne gives you finer heating units to sell — and then does a whale of a lot of pre-selling for you! • Payne has manufactured gas fired appliances exclusively for more than a quarter of a century.

Payne
FURNACE AND SUPPLY CO., INC.
BEVERLY HILLS, CALIFORNIA

THE IDEAL FUEL GAS

Book Reviews

Combustion, Flames and Explosions of Gases, by Bernard Lewis and Guenther von Elbe. Published by The Macmillan Company, New York. 415 pages liberally illustrated. Price: $5.50.

The interest in combustion phenomena, shared alike by chemists, physicists, and engineers, has led to a large number of investigations which vary widely in purpose and accomplishment as well as in actual scientific value. The need was for co-ordination and critical appraisal of these recorded investigations. This is the first purpose of the book. Secondly, believing that well-founded speculation has great value as a stimulus to further research, the authors have not hesitated to express rather definite views on some highly controversial subjects. These views are given with full reasons for their adoption, but the authors invite any disagreement that is based on logical alternatives.

The book is in four parts: Chemistry and Kinetics of the Reactions between Fuel Gases and Oxygen; Propagation of Flames; State of the Burnt Gas; Problems in Technical Combustion Processes.

The treatment of the subject throughout is mathematical and highly technical. The book is distinctly one for the advanced student or research man.

An Investigation Into the Causes and Prevention of the Corrosion of Tar Stills. By D. D. Pratt, M.A., Ph.D. with H. C. K. Ison and R. G. Wood, Chemical Research Laboratory, Teddington, Middlesex, England. Available at British Library of Information, 270 Madison Avenue, New York. Price 30c per copy.

It had been found from practical experience that the life of tar stills handling vertical retort tar was only about half that of those used on tar from horizontals.

Investigations carried out at the Chemical Research Laboratory had the following main objectives:

(a) the identification and the isolation, wherever possible, of tar constituents responsible for corrosion;

(b) the suggestion of means whereby such corrosion could be either reduced or eliminated.

It was proved that the *benzene soluble resinols* are the constituents most active in promoting corrosion at high temperatures. In the presence of ammonium chloride the activity of these materials is intensified.

Suggestions are made for the mitigation of the corrosive action, but it is frankly intimated that the use of a constructional material that will withstand corrosion will frequently be the real solution.

Efforts made to develop a protective coating for mild steel were unavailing but experiments showed that nickel-chromium steels containing 2.5 Ni and 0.6 Cr were moderately resistant to the action of resinols whereas the stainless steels tested were quite unattacked. Alloys of composition 80/14/6 Ni Cr Fe and of 60/40 Ni Cu were also very resistant.

General Controls Opens Houston Branch

The General Controls Company announces the opening of a new branch office in Houston, Texas, where a complete stock of General automatic temperature pressure and flow controls, sales and service will be maintained.

A New Model for an Old Need

THE REPUBLIC MODEL A22GL

Your prices and data sheets are ready

AUTOGAS CORPORATION

2258 Diversey Ave., Chicago, Ill.

ALFRED I. PHILLIPS

CONSULTING ENGINEER

Rate Developments Valuations

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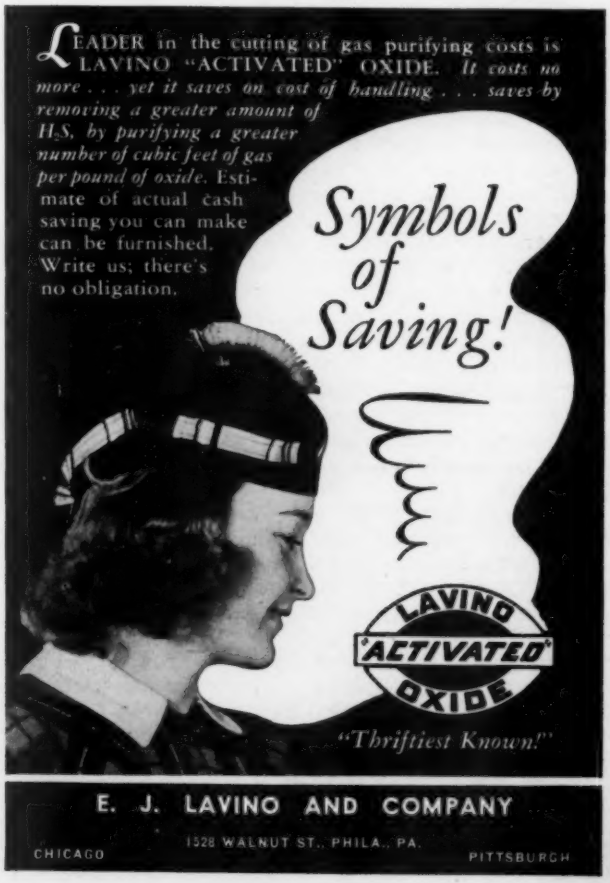
53 PARK PLACE NEW YORK


LEADER in the cutting of gas purifying costs is LAVINO "ACTIVATED" OXIDE. It costs no more . . . yet it saves on cost of handling . . . saves by removing a greater amount of H_2S, by purifying a greater number of cubic feet of gas per pound of oxide. Estimate of actual cash saving you can make can be furnished. Write us; there's no obligation.
Symbols of Saving!
LAVINO
"ACTIVATED"
OXIDE
"Thriftiest Known!"
E. J. LAVINO AND COMPANY
CHICAGO
1528 WALNUT ST., PHILA., PA.
PITTSBURGH

New Equipment

New Dresser Street Ell

A new Street Ell designed for permanently tight connections where the service joins the main is announced by S. R. Dresser Manufacturing Co., Bradford, Pa.

According to the manufacturer, this new fitting, known as the Super Service Threaded-End 90° Street Ell, prevents leaks as it eliminates threads on the service pipe and absorbs harmful movements of either service or main.

Elimination of threads to prevent failures due to corrosion, comes through the use of the Dresser "pack" which takes plain-end pipe having full strength and thickness at the ends.

Harmful pipe movements and leverage, the cause of numerous failures in rigid joints, are absorbed by a resilient, wedge-shaped, rubber-compound gasket. Service work is made easier by doing away with threading; precise lining up of pipe; turning of long pipe lengths; exact pipe lengths and work starting threads.

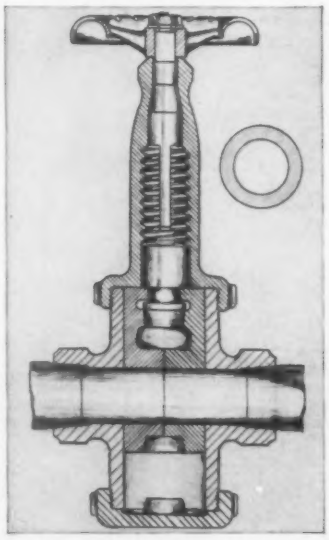
Other advantages are easy assembly on services out of line, wedge-shaped gaskets and ample 'take-up' of nut on body to give reserve sealing power and permanent gas-tightness, elimination of need for disassembly before installation, cup-shaped gasket-retainer ring completely confining gasket to prevent nut from fouling on gasket, rugged construction, easy to install.

Available in 1", 1¼", 1½", and 2" ID straight sizes, with plain, *armored*, duck-tipped, or lead-tipped gaskets.

Packless Gate Valve

The Monat Valve and Forge Company, 956 Bessemer Bldg., Pittsburgh, Pa., is offering a packless, cylindrical gate valve, suitable for high as well as low pressures and temperatures.

This new, rugged valve, designated as the Monat "Stream-Flow," contains the salient construction features of both gate and plug valves but none of the disadvantages of either. There are no cavities and friction is eliminated. It is available in sizes ranging from ½" to 8" in the standard metals. Also in special metals and alloys for lines handling corrosive liquids and gases. The body of this new valve carries a cylindrical bore, at right



angles to the line of flow. A cylindrical gate is moved up and down by means of a screw in the valve bonnet, and is prevented from turning by a key in the cylindrical bore. No packing is required. A cap on the bottom of the body and the removable bonnet permit cleaning the valve while it is in the line. Descriptive circular sent on request.

General Controls Thermovalve

A new gas valve that automatically shuts off the gas flow in case of pilot light failure is announced by the General Controls Company under the trade name, "Thermovalve."

This new Thermovalve is actually a thermocouple pilot and manual reset gas valve combined.

The tip of the couple is placed in the pilot flame and the valve is set open by hand by removing cap at bottom and pushing up on the stem. No current is required—the thermocouple when heated develops enough current to hold the valve open. If the pilot light fails, the valve immediately closes.

The Thermovalve is particularly valuable in controlling installations where no current is available and where a complete gas and pilot shutoff is required;—or where non-current-failure controls are used.

A bulletin on this product may be had by writing the General Controls Co., 450 East Ohio Street, Chicago, Illinois.

Dockson Pressure Regulator

This new and different "Midget" Regulator is made possible by the patented Dockson process of die casting alloys into finished regulator parts.

Precision and savings in manu-

and Appliances

facture, never previously obtained by other methods, now revolutionize the apparatus for control of air pressures through the reduction and stabilization of these pressures.

Time-tested and proven principles of pressure regulation are incorporated in the Model 38 Regulator to make it safe, accurate, and dependable in operation. Cut shows actual size.

Made by C. H. Dockson Co., 2885 E. Grand Boulevard, Detroit.

Friez Automatic Gas Pilot

An Automatic Gas Pilot is announced by Julien P. Friez & Sons of Baltimore, Maryland (a division of the Bendix Aviation Corporation).

The manufacturers claim for this device reliability of the pilot burner itself, efficient direction and protection of the pilot flame, a safety feature whereby in the event of the pilot burner's going out, the main burner is automatically shut down and remains shut down until the pilot burner has been relighted. Simplicity and freedom from service attention. Low cost and adaptability to varying applications.

The pilot contains only one moving component part. The pilot burner itself is of orthodox Bunsen type but is furnished with a long, protective flame guide of high temperature resisting chromium nickel alloy steel.

Complete details are included in Friez Bulletin No. 5P available from the manufacturers on request.

Friez "Nite-Temp" Clock Switch

A new synchronous, self-starting electric clock switch especially suited for day-night temperature control applications is offered by Julien P. Friez & Sons of Baltimore, Maryland.

This new clock switch, handsome in design and finish, used in conjunction with thermostats and effective temperature control instruments is an automatic night-time temperature setback. The "NITE-TEMP" clock switch may be located either with the thermostat or other control instrument concerned, or in some remote location—wherever a handsome electric clock would be of use as a timekeeper.

Overhead Gasconaire Furnace

A gas-fired heating system of novel design has been put on the market by Gasconaire, Inc., 3255 Goldner Avenue, Detroit, Michigan.

The Overhead Gasconaire is suspended from the basement ceiling, up and out of the way, allowing a person to walk under it.

It heats by means of warm air and operates automatically. The heated air is driven over the heat-radiating unit to the registers, through ducts, by a direct-driven multi-speed blower. The return air passes through four filters before being again sent over the heating unit. As the blower has no pulley or belts, it is quiet and flexible. All that is necessary to change the speed is the turn of a button instead of shifting a belt from one pulley to another.

It is approved by the American Gas Association Laboratories. Complete description in bulletin issued by the manufacturer.

News of the Industry

J. E. Tobey to Serve with Smoke Prevention Assn.

J. E. Tobey, manager, fuel engineering division, Appalachian Coals, Inc., has been chosen to serve on the Public Service Committee of the National Smoke Prevention Association, Inc., during 1938-39, the appointment having been made by William Culbert, smoke inspector of Nashville, Tenn., who is president of the association. Another Cincinnatian, Frank H. Lamping, executive secretary, The Smoke Abatement League of Cincinnati, has also been named to serve with Tobey on this committee.

Appalachian Coals, Inc. and Tobey have been active in recent years in educational and engineering phases of smoke abatement work. The ACI organization, for example, has offered its service facilities to smoke prevention authorities and organizations in the 100 or more cities in which high volatile bituminous coals move from Kentucky, Tennessee, Virginia and West Virginia.

CONVENTION CALENDAR

September

9-10 *Maryland Utilities Assn.* Fall Convention. Ocean City, Maryland, George Washington Hotel.

14-16 *Pacific Coast Gas Association,* Annual Convention, Santa Barbara, Calif.

15-16 *Empire State Gas & Electric Assn.* Annual Convention. Lake Placid Club. Lake Placid, N. Y.

October

10-14 *American Gas Association,* Annual Convention, Atlantic City. (No exhibits.)

Ohio Fuel Gas Company Employs Effective Similes in House Heating Copy

COMFORT
GAS heat brings contentment
What a feeling of genuine well being is afforded by automatic gas heat! Instead of being burdened by daily furnace tending, you don those comfortable house slippers, relax in your favorite easy chair and let gas heat take care of itself. Isn't such satisfaction worth a great deal more? Yet modern gas heat costs no more—all incidental expenses of out-moded methods considered. Request a free heating survey now.
Cease Firing
HEAT WITH GAS
The Gas Company
CLEAN
SOAP
GAS is the perfect heating fuel
There is no fuel like gas for home heating. It eliminates all the fuss and muss of out-moded heating methods. It assures clean, healthful heat of uniform temperatures all winter long. And, it is completely automatic in operation. Phone at once for a free heating survey of your home. Find out how reasonable in cost is this finest of all heating methods.
Cease Firing
HEAT WITH GAS
The Gas Company

The comfort and cleanliness of gas for house heating is well expressed and illustrated in these two advertisements, part of a series used by The Ohio Fuel Gas Company of Columbus. Original size of advertisements 7½ in. high two column. The "Cease Firing" slogan with the shovel cast aside is used as a small spot illustration. The text matter is brief and direct, yet employs polite approach with convincing appeal.

New Residential Sales Course To Be Ready This Fall

As one of its most important sales promotional activities for the coming year, the American Gas Association announces a new training course in selling gas service and gas appliances to residential customers. This new course is now being prepared under the supervision of the Commercial Section of the Association. It is planned to have the course ready to start about November 1st. Full details will be announced early in October.

This announcement will be good news to all member companies, in the light of the success so many obtained with the A.G.A. Course in Domestic Gas Salesmanship brought out some years ago. The new course, geared to meet present-day requirements, is the logical answer to the vastly changed conditions that influence the selling situation in the industry today. Like its predecessor, this will be a tailor-made job, based on facts about the immediate problems that continually face gas company salesmen and sales executives, and presenting the methods and procedures by which these problems are successfully being handled under the conditions now existing.

This new course is being prepared by Trade-Ways, Inc., formerly Business Training Corporation, the organization that produced the earlier course in gas salesmanship. Those member companies that subscribed to the former course will remember its great value to their sales forces, and may rest assured that the forthcoming course will be even more specific in dealing with the "how" and "why" of present-day selling.

In discussing the new course, Mr. Hugh Cuthrell, Chairman of the Commercial Section, American Gas Association, said in part: "Good as the former course in Domestic Gas Salesmanship was—and every company that subscribed to it will, I believe, agree that it produced excellent results—there is no question that it is out of date. Business in general and the gas industry in particular have undergone so many changes during the past ten years that today we are up against a brand new set of sales problems, many of which were not in existence when the old course was published. Meanwhile, great improvements have been made in domestic gas appliances themselves. So we need a brand new course to help our members meet these changed conditions. This is now being prepared under the supervision of the Commercial Section, and we fully expect that it will be available to member companies early in November. A definite announcement of the publication date, together with full details about the contents of the course, will go out about the time of the Convention."

Bong! Bong! Bong! Chimes Charm 17 Winners

Awarding of the seventeen Grandfather clocks offered as trophies to the seventeen gas utilities that were ahead in gas refrigerator sales during the April-May-June period of the "Make-Every-Minute-Count" contest conducted by the American Gas Association Refrigeration Committee, has been announced by H. R. Sterrett, the 1938 chairman of the Committee. These seventeen victors in the campaign were informed on Aug. 5 that they had been named as winners in their respective divisions and were notified at the same time that the trophies would be delivered shortly to their respective destinations. The large number of cash awards offered to companies and individual winners have been paid, it was announced.

The victory will be celebrated at the forthcoming A.G.A. convention at Atlantic City in October when a Grandfather clock will be on display as a reminder of the successful manner in which gas refrigerator sales were made in a year when competition in the gas refrigeration selling field is said to have been keener perhaps than in any other time in the history of the industry.

The Grandfather clock winners are:

Division 1—Kings Appliance Corp., Brooklyn, N. Y., and the Peoples Gas Light & Coke Company, Chicago, Ill.

Division 2—Providence Gas Company, Providence, R. I.; Laclede Gas Light Co., St. Louis, and the Westchester Lighting Co., Mount Vernon, N. Y.

Division 3—Florida Public Service Company, Orlando, Fla.; Metropolitan Edison Company, Easton, Pa., and Central Illinois Light Company, Springfield, Ill.

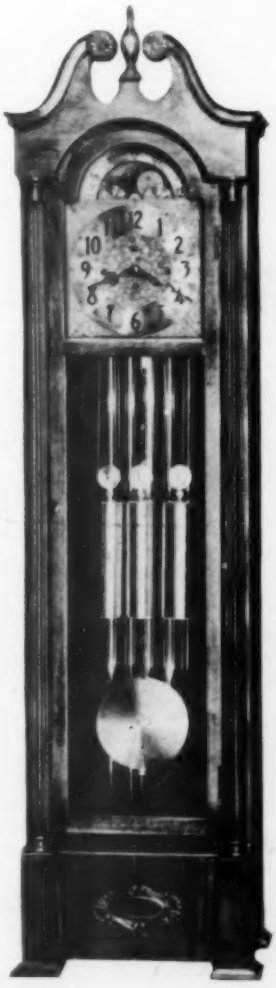
Division 4—Ohio Fuel Gas Co., Columbus, Ohio, and the Kansas City Gas Company, Kansas City, Mo.

Division 5—Manufacturers Light and Heat Company, Bellevue, Pa.; Houston Natural Gas Company, Houston, Tex., and the Atlanta Gas Light Co., Atlanta, Ga.

Division 6—Manufacturers Light and Heat Company, East Liverpool, Ohio; Ohio Fuel Gas Company, Athens, Ohio, and the North Penn Gas Company, Port Allegany, Pa.

Division 7—The Durham Gas Company, Durham, N. C. In this division, the Virginia Gas Distribution Corp., of Staunton, Va. (Staunton, Waynesboro and Culpepper) received a hall clock and cash for being in second place, and the Gettysburg Gas Corporation of Gettysburg, Pa., received a mantel clock and cash for being third winner. Cash awards alone were granted to the following seventh division companies: Tex-Mex Natural Gas Company, Houston, Tex.; Virginia Gas Distribution Corporation, Covington, Va. (Covington, Clifton Forge, Lexington and Warrenton); United Gas Corporation, Houston, Tex.; Manufacturers Light and Heat Company, East Liverpool, Ohio (Chester, W. Va., and Wellesville, Ohio); Kentucky Natural Gas Corp., Owensboro, Ky.; Eastern Shore Gas Corporation, Pocomoke City, Md.; Washington County Gas Company, Johnson City, Tenn., United Gas Corp., Houston, Tex. (Nacagdoches District); and the Ohio Fuel Gas Co., (Barnesville Branch) Cambridge, Ohio.

H. R. STERRETT



Companies that received Grandfather clocks were also the recipients of cash awards.

Cash awards also were granted to the Home Service Departments of the trophy winning companies wherever such companies have regularly employed home service directors or departments. These companies were: Kings Appliance Corp.; Peoples Gas Light and Coke Company; Providence Gas Company; Laclede Gas Light Company; Westchester Lighting Company; Florida Public Service Company; Metropolitan Edison Company (Easton, Pa.); Central Illinois Light Company, Springfield, Ill.; Ohio Fuel Gas Company, Columbus, Ohio; Kansas City Gas Company; Houston Natural Gas Company; Atlanta Gas Light Company; Ohio Fuel Gas Company, (Circleville Branch) Athens, Ohio; North Penn Gas Company; and the Durham Gas Company.

In addition to the monthly awards granted to several hundred sales employees whose sales put them at the top during the campaign, grand awards, consisting of handsome gold watches were made to twenty-three persons in the sales departments of the following companies: Brooklyn Union Gas Company; Westchester Lighting Company; Providence Gas Company; Florida Public Service Company; Scranton-Spring Brook Water Service Company; Queensboro Gas and Electric Company, Far Rockway, L. I.; Ohio Fuel Gas Company; Houston Natural Gas Company; Central States Power and Light Corporation of Tulsa, Okla.; Greensboro Gas Company, of Brownsville, Pa.; North Penn Gas Company, Port Allegany, Pa.; Manufacturers Light and Heat Company; Mobile Gas Service Corporation; and the Kentucky Natural Gas Corporation.

Sixty-six sales employees of participating companies shared in final cash awards amounting to around $2,000. These final cash awards were bestowed on leading salesmen whose high records were features of individual gas refrigerator selling during April, May and June. The final award winners were employed in many cases by companies already mentioned in foregoing paragraphs. Other companies whose salespeople received final cash awards were: Boston Consolidated Gas Company; Brooklyn Borough Gas Company; Philadelphia Gas Works Company; Washington Gas Light Company; Detroit City Gas Company; Equitable Sales Company, Pittsburgh; Southern California Gas Company and Southern Counties Gas Company, both of Los Angeles.

The "Make-Every-Minute-Count" campaign was conducted by the A.G.A. Refrigeration Committee and sponsored by Servel, Inc., through the Association of Gas Appliance and Equipment Manufacturers.

A. G. A. Convention

(Continued from page 11)

Leader: F. T. BROOKS, Philadelphia Electric Co., Philadelphia, Pa.; DANIEL J. BROGAN, The G. S. Blodgett Co., Inc., New York, N. Y.; OLIVER LLOYD MADDUX, Eclipse Fuel Engineering Co., New York, N. Y.; C. GEORGE SEGELER, American Gas Association, New York, N. Y.

TECHNICAL SECTION

TUESDAY, OCTOBER 11
2:00 o'clock

Address of Chairman, J. V. POSTLES, *Chairman*, Technical Section, Philadelphia, Pa.

Report of Nominating Committee, M. I. MIX, *Chairman*, The Peoples Gas Light & Coke Co., Chicago, Ill.

Gas Conditioning Committee, O. S. HAGERMAN, *Chairman*, Atlantic Seaboard Corp., New York, N. Y.

(a) A Primer on Deposits in Gas Pipes and Appliances, DR. A. R. POWELL, Koppers Co., Pittsburgh, Pa.

(b) Control of Deposits in Manufactured Gas Distribution Systems, A. R. BELYEA, Consolidated Edison Co. of New York, New York, N. Y.

(c) Sulphur Corrosion of Materials, H. D. LEHMAN, The Philadelphia Gas Works Co., Philadelphia, Pa.

Research and Recovery—Which Comes First? PROF. ERWIN H. SCHELL, Massachusetts Institute of Technology, Cambridge, Mass.

The Importance of Cadet Engineering Training to the Gas Industry.
(Speaker to be announced)

Sales and Service, B. T. FRANCK, Grand Rapids Gas Light Co., Grand Rapids, Mich.

Chemical Committee, PROF. J. J. MORGAN, *Chairman*, Columbia University, New York, N. Y.

WEDNESDAY, OCTOBER 12
2:00 o'clock

Production Committee, C. R. LOCKE, *Chairman*, Chicago By-Product Coke Co., Chicago, Ill.

Colloidal Properties of Spent Oxides, DR. W. J. HUFF, University of Maryland, College Park, Md., and DR. FRANK H. DOTTERWEICH, Texas College of Arts & Industries, Kingsville, Texas.

Extinction of Gas Flames by Steam, Data Underlying the Practice of Steam Purging, LOUIS SHNIDMAN, Rochester Gas & Electric Corp., Rochester, N. Y.

Steam Purging, R. E. KRUGER, Rochester Gas & Electric Corp., Rochester, N. Y.

THURSDAY, OCTOBER 13
2:00 o'clock

Distribution Committee, H. L. GAIDRY, *Chairman*, New Orleans Public Service, Inc., New Orleans, La.

Engineering Significance on the National Bureau of Standards Soil Corrosion Data, K. H. LOGAN, National Bureau of Standards, Washington, D. C.

High Pressure Welding, DR. W. A. PEARL, Armour Institute of Technology, Chicago, Ill.

Variations in Mixing Formulae in Higher B.t.u. Gases, L. J. WILLIEN, Public Utility Engineering & Service Corp., Chicago, Ill.

The Mystery Chef Comments On the CP Range

"In offering my opinion of the CP range, I speak only as a practical cook who has prepared every meal in my home every day since May 1, 1907. My cooking experience has fortunately forced me at various times to use various forms of heat. I spent several months on a farm cooking on a wood fire stove. On other occasions I have had months of experience with coal and oil ranges. I have also used the latest models of electric ranges. I started my cooking experience on a gas range; an old black clumsy gas range that had to be polished with stove polish. It had no heat control and such a thing as insulation was not thought of. I have always been very much engaged in business so had to prepare the dinner every evening after my return from the office.

"The CP range means much more to the practical cook than can be told in the small space allotted to me. I say practical cook advisedly because there is a vast difference between a practical cook who daily prepares the meals in the home and a "scientific" cook who experiments with one thing at a time, with little knowledge of the daily grind of preparing 2 or 3 meals a day for a family of 5 or 6.

"The fact that an oven will bake evenly on any shelf in the oven is a tremendous advance and means much to the woman who bakes. The speed with which water can be brought to the boiling point and the oven brought up to 500° or 600° F. temperature again means much to the busy housewife in starting the meal.

"Some of the advantages offered in the CP gas ranges have been obtainable in some ranges, but to have all these advantages brought together in one range definitely means that gas stands supremely unchallenged by any other heat for cooking. As a matter of fact, to the practical cook gas has always stood unchallenged by any other heat. Its flexibility alone gave it a unique position in the field of cooking that has never been challenged. With all the many advantages of gas brought together in the form of CP gas ranges, I say again gas stands not only unchallenged but *supremely* unchallenged in the art of excellent cooking."

INDUSTRIAL GAS BOILERS

Tubular or Flueless
¾ to 45 H.P.

P. M. LATTNER MFG. COMPANY
CEDAR RAPIDS, IOWA

A.G.A.E.M. Issues List of Gas Companies With Data

The Association of Gas Appliance and Equipment Manufacturers is now supplying its members with a complete, yet simplified, listing of all gas distributing companies operating in the United States, it has been announced.

This compilation, classified according to states, includes the names of all the companies supplying gas service, their principal offices, the total number of customers served by each, the kind of gas they supply, and the heating value of their fuel.

An introductory classification gives the total number of gas companies operating in each of the states, and their total number of gas customers.

A new practical feature included in this tabulation by the Association's statistical department is the providing of a blank column on each page of listed companies for the use of the manufacturer. Thus, if a manufacturer, for example, desires to list the number of appliances sold to various gas companies within a certain period, he will find adequate space for that purpose.

Two supplements are also being distributed. The first supplement lists the gas distributing companies operating in the Dominion of Canada. The second gives the names of the holding and managing companies of gas properties and operating subsidiary gas companies in the United States, their principal offices, and the number of gas customers served by each of their operating companies.

Refractory and Insulating Products

Munn and Steele, Inc., 500 Fifth Avenue, New York, announces a new and interesting line of insulating and refractory products.

William S. Steele, President of the corporation, is a pioneer in the vermiculite industry, having acted as general sales manager for F. E. Schundler & Co. since the commencement of the vermiculite activities of that company. His technical papers on Zonolite research are widely quoted in engineering circles.

A basic raw material position has been assured through contract with the Zonolite Company and the expanded Zonolite marketed by Munn and Steele, Inc., will be sold under that registered trade-mark.

Light-weight insulating refractory bodies formulated on a base of Zonolite include Fire Chambers, Baffles, Radiation Discs, 2000° brick and shapes.

New Compound Facilitates Cceaning After Welding

A new compound, which is said to reduce cleaning time after welding by 20% to 60%, is announced by The Lincoln Electric Company, Cleveland, Ohio.

This compound, known as "Spatter Film," has been developed by Lincoln engineers to increase the economy of electric welding as a process of manufacture and fabrication. By reducing the tendency of spatter to adhere tightly, it makes fabrication by arc welding still more economical. The savings resulting from use of the compound will be particularly apparent in work where painting and finishing are essential.

"Spatter Film" is soluble in water. It is non-inflammable, contains no free alkali to injure the hands nor harm paint and is easy to apply by means of an ordinary paint brush. Only sufficient of the film need be applied to cover the work adjacent to the seam or joint. A gallon of "Spatter Film" will cover approximately 50,000 sq. inches of surface. It can be removed readily for painting by wiping with a clean cloth, if still wet, or by washing it off with water if dry.

Savings in cleaning time, through use of "Spatter Film," ranged between 20% and 60% on various applications of the compound. Time to clean welded work, consisting of a 10-inch single bead fillet weld joining two pieces of 12-gauge plate with 5/32-inch eelctrode was .84 minutes using the compound, as compared with 1.04 minutes without it. Ordinary cleaning tools, consisting of wire brush, flat sharp chisel or old file sharpened as chisel, were employed.

The compound is sold in quart, gallon and 5-gallon cans, or 55-gallon drums. Weight is 8¾ lbs. per gallon.

Food For Thought

1. 20,000 miles of mains surveyed.

2. 14,000 new gas leaks located.

3. 40,000 valuable reports made on trees and shrubs.

4. 150 companies using the service.

5. Enough savings in unaccounted for gas to pay the bill.

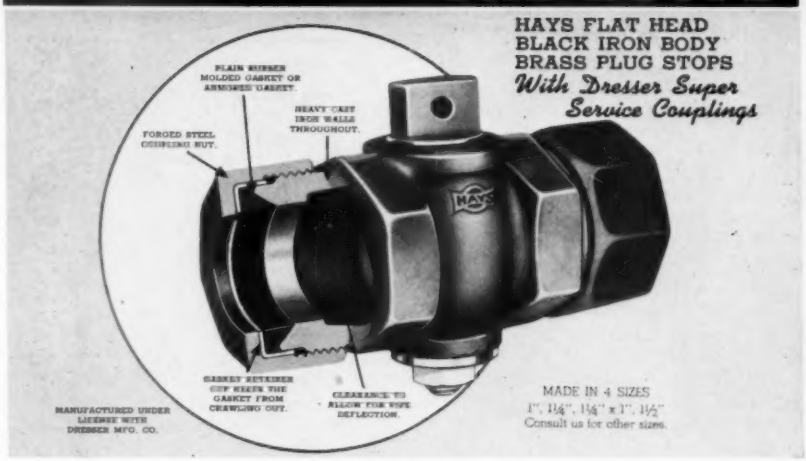
6. A trial will convince you.

May we hear from you?

New England Forestry Service Inc.

75 Federal St., Boston, Mass.

HAYS *Threadless* GAS STOPS


HAYS FLAT HEAD
BLACK IRON BODY
BRASS PLUG STOPS
With Dresser Super Service Couplings
PLAIN RUBBER MOLDED GASKET OR ARMORED GASKET.
HEAVY CAST IRON WALLS THROUGHOUT.
FORGED STEEL COUPLING NUT.
GASKET RETAINER CUP KEEPS THE GASKET FROM CRAWLING OUT.
CLEARANCE TO ALLOW FOR PIPE DEFLECTION.
MANUFACTURED UNDER LICENSE WITH DRESSER MFG. CO.
MADE IN 4 SIZES
1", 1¼", 1¼" x 1", 1½"
Consult us for other sizes.

Hays now provides a threadless method of hooking-up service pipe. Elimination of threaded pipe ends adds 40% to the strength of pipe in the joint. An outstanding feature is the ease of assembly under any conditions. The pipe is in constant seal but floats in the joint to permit flexing due to vibration or ground pressure. Large pack surface of gasket assures tight connection even with corroded or deflected pipe. Write for data.

HAYS MFG. CO., ERIE, PA.

Combustible Gas From Decomposed Sewage To Be Stored in Arc Welded Holder

A pressure gas holder has been completed at the Cuyahoga Heights southerly plant of the $14,000,000 sewage disposal project of Cleveland, Ohio.

The holder is a 57½ foot diameter arc welded sphere having a capacity of 200,000 cu. ft. of free gas at 29 pounds operating pressure.

The purpose of the holder is to store gas produced in excess of normal consumption and to pay out deficiencies as required. The sphere floats on the line in much the same manner as an elevated tank in a water system. The surplus gas in the sphere will be compressed and paid out into the service lines as needed for laboratory, boilers and two 400 horsepower gas engines. In normal operation of the plant, with the sphere off the line, gas is generated at a pressure of approximately 20 inches of water which is sufficient to supply the engines and boilers. Generation of gas is by natural decomposition, accelerated by controlled digestive elements.

The holder was fabricated by the Chicago Bridge & Iron Company by the electric arc process of welding, using "Fleetweld" shielded arc type electrodes supplied by The Lincoln Electric Company.

In constructing the sphere, steel plate was cut and formed in such a way as to provide the desired shape when the pieces were assembled together. Plate edges were scarfed to assure complete penetration of welds. All joints were butt welded from both sides. Where more than one bead of weld metal was applied, each bead was scraped, wirebrushed and peened before application of the next.

When erection was completed, the holder was tested to a pressure of 45 pounds per sq. in. minimum, after all joints were coated with linseed oil.

Catalogs

Gas Holder Protection. Bulletin 502 of Inertol Co., 401 Broadway, New York, describes characteristics and application of Imunol and Inertol for exterior and interior protection of gas holders and other steel surfaces. A table of surface areas of various capacities of holders and quantity required is included.

Speed Control Units. Including variable speed transmission, variable speed motor pulley and Motodrive, Reeves Catalog G-384 devotes 124 pages to the subject. Printed in two colors with more than 200 illustrations and engineering data this catalog is available free from Reeves Pulley Company, Columbus, Ind.

For Welding Operations. Bulletin 329 of Lincoln Electric Co., Cleveland, describes the "Linconditioner" a power and filter unit to improve operating conditions for welders doing interior or exterior work.

Water Heaters. Catalog 15-I.P.C. of Hotstream Heater Co., 8007 Grand Ave., Cleveland describes their complete line of water heaters and accessories. Included also are tables and curves together with data for estimating water heating costs.

Refractory Products. In a new 20-page engineering data book, Johns-Manville has made available full information on the J-M line of refractory products—including cements, castables and plastics. The descriptive material includes data on the character or base of each product, its highest working temperature and quantity needed for various work. Specific attention is given to coal and water gas apparatus, by-product coke ovens, laying fire brick and patching operations.

Copies of the book, Form DS Series 700, are available upon request to Johns-Manville, 22 East Fortieth Street, New York City.

Feed Water Regulator. Bulletin 413 of Northern Equipment Co., Erie, Pa., describes and illustrates installation of Copes "Flowmatic" Regulator to the gas fired steam plant of Fort Bend Utilities Co. at Sugarland, Texas and operating results achieved. Copies sent on request.

Compressors. Bulletins 322 and 323 of Cooper-Bessemer Corp., Mount Vernon, Ohio, describe Type G-MS two cycle compressor unit 40 to 50 hp. convertible from gas to oil fuel and type G-MV two cycle compressor, the latter rated from 400 to 800 b.h.p., built in 4, 6 and 8 cylinder sizes. Bulletins sent on request.

Super Duty Refractories. A new twelve-page booklet entitled "How To Reduce Spalling With Super Duty Refractories" has just been published by the General Refractories Company, Philadelphia, Pa. It is attractively printed in two colors and gives charts, tests, and general information on three types of super duty refractories—Hiac, Superac and Airam.

Pipe Welding Bulletin. Arc welding of piping for operation at pressures up to 1500 pounds per square inch and temperatures up to 1000° F. is covered in a new 12-page bulletin issued by the Metal & Thermit Corporation, 120 Broadway, New York, N. Y. In addition to the selection of pipe materials and welding electrodes, this bulletin discusses weld design, welding procedure, preheating, stress relieving, testing of welds and the qualification of welding process and welding operators.

Ranges. Standard Gas Equipment Corporation recently released a new catalog of Acorn, Oriole and Vulcan ranges. Of special interest in the new catalog are ranges with heated warming closet, large enough so that a roast can be kept hot and dishes warmed at the same time. These warming closets are heated by a small burner. In the warming closet an insulated cooker can be placed on a folding shelf. The warming closet burner cooks the meal in the cooker for about half the cost. This arrangement is exclusive with SGE. For copy write to—Standard Gas Equipment Corp., 18 East 41st Street, New York, asking for catalog No. 16.

Diesel Engines. Nordberg Bulletin 77 describes dual fuel burning full Diesel engine designed to operate with oil or gas. Results of official tests of these units at the City of Lubbock, Texas are given in detail. Bulletin available through Nordberg Mfg. Co., Milwaukee, Wis.

Compressors. Sullivan Machinery Company, Michigan City, Ind., has issued Bulletin A-12-A on single-stage horizontal compressors. This includes illustrations and description of an improved "Dual-Cushion" valve now being used in these machines. The WG-7 compressors, built for heavy duty service, are single-cylinder double-acting type with Timken double-row main bearings, replaceable cylinder liners, force-feed cylinder lubrication. Sizes 40 to 125 hp., pressures 10 to 125 lbs.

Excavators. The Harnischfeger Corporation of Milwaukee, manufacturer of "Pacemaker" Excavators, announces the completion of Bulletin TX-45, which completely describes the many sizes and types of P&H truck-mounted cranes and excavators. With nearly half of its 30 pages devoted to "candid" action pictures, this new bulletin is a pleasing departure from the average booklet on this type of equipment.

Welding Electrodes. The Harnischfeger Corporation of Milwaukee, manufacturers of P&H-Hansen Welders, announces Bulletin R-5 which gives complete and specialized information and data on each of the many Smootharc Welding Electrodes. A modern manual of welding electrode information, this bulletin includes spar tests, procedure sheets and many other informative suggestions to make it a valuable reference book for all welder users and operators.

Insulating Refractories. Quigley Co., Inc., 56 West 45th Street, New York, have issued an 8-page illustrated bulletin on Insulag, a strong, non-shrinking refractory lagging for inner-face temperatures up to 2200° F., or directly exposed to 2000° F., which can be applied on hot surfaces.

To engineers, the full page charts, to determine thickness of Insulag required for hot face temperatures and ascertaining efficiency of thicknesses, are valuable features of the bulletin.

To the man who does the
WORRYING
about purification

•

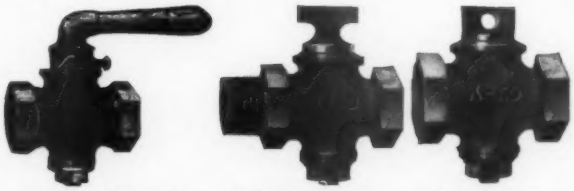
WHAT are the desirable qualities of a good oxide? *Uniformity, consistency in performance and tried economy.* How can we prove that these are the characteristics of GPM Iron Hydroxide aside from our mere statement?

PROOF of the pudding is still in the eating. Out of 3,000,000 bushels of oxide sold in the past two years 2,000,000 were *repeat orders!* This is the record of confidence in *Gas Purifying Materials Co., L. I. City & Providence.*

GPM
IRON HYDROXIDE

removes sulfur from gas and wrinkles
from the gas man's brow

Performance you'll swear by not at



G-210—Socket Head Standard Gas Stop

G-213—Tee Head Standard Gas Stop Male and Female

G-201—Flathead Standard Gas Stop

KITSON COMPANY
2409-15 Westmoreland St. Philadelphia, Pa.

Kitson Safety Devices (Lovekin Patents) for Domestic Water Heaters

Quality Brass Goods for Gas, Water and All Plumbing Uses

ESTABLISHED 1897

The Outstanding Gas Purifying Material » » »

Highest H_2S removal combined with complete removal of traces. Physical structure insures very low box back pressures.

THE RECOGNIZED PURIFYING MATERIAL FOR VAPOR PHASE GUM CONTROL.

Ask for our bulletins Nos. AL-18-19 which are very interesting

THE ALPHA-LUX COMPANY, Inc.
192 FRONT ST., NEW YORK
Philadelphia Chicago

100 Pounds or More Cut to Medium or Low Pressure

Toggled Reducing Regulator

GAS pressures of 50 to 100 pounds or more in tanks or transmission lines are reduced to medium or low pressure in the distribution system by the Fulton Toggled Reducing Regulator. It can be equipped to operate with either natural or manufactured gas, maintaining the desired delivery pressure. For reversing furnaces, it is constructed with oversize valves. Also adapted for control of By-Product Coke Oven Gas. Ask for Circular No. 2573.

The
CHAPLIN-FULTON MFG. Co.
28-40 Penn Ave. Pittsburgh, Pa.

All sizes up to 3,400 cu. ft. capacity

Meters
Diaphragms
Repairs
Provers
Pumps
Calorimeters
Wet Meters
Gauges
Apparatus

METER REPAIR PARTS
FOR
ALL MAKES — ALL SIZES OF METERS

LARGEST GAS COMPANIES NOW USING OUR PARTS

SEND FOR OUR CIRCULAR ON METER REPAIR PARTS

SAMPLES AND PRICES GLADLY SENT

— 0 —

LAMBERT METER CO.
BUSH TERM. BLDG. 4, BROOKLYN, N. Y.

Pipe Corrosion and Coatings

(Continued from page 30)

77° F. At 160° F. the tensile strength of the same material was 350 pounds per square inch. A maximum strength of 200-300 pounds is more frequently encountered. Those in the lower range possess more than adequate strength to meet requirements after laying, but the higher strengths do provide a material less likely to damage during application and installation.

Thickness

The minimum thickness of 3/64", and a maximum of 1/16" is usually specified for a tar base enamel. The lower limit has been established by tests and experience which indicated that attempts to secure thinner coatings resulted in rapid failure. Thinner sections are more subject to accidental damage, more apt to be porous, have less consistency considering the various requisites of a good coating and are more difficult to apply. The maximum is established to avoid unduly brittle sections and to maintain the lowest cost. Many specifications set the two limits and allow the difference as the only tolerance.

Soil Stress

Enamels having a tar base require shields to protect against soil stress, if the protection is to be economically justified. There have been attempts to encourage the use of so-called plasticized enamels for the exterior surface of buried pipes. The toughness of the plasticized enamels have favored their use for the interior surface of water mains. Toughness is usually secured by having a lower melting point than is desirable for sub-surface coatings. Even with higher melting points, the toughness, while improving certain qualities, does not add any resistance to soil stresses; and such coatings must have a shield for the most effective resistance against physical forces.

Absorption

Tar being one of the most effective of commercial water-proofing agents, its absorption of moisture is known to be low. Most tar base enamels will gradually absorb 2 to 4% by weight during the first two to three years of service, and then will not change or will have an almost imperceptible increase in moisture content. Very few exceptions have been found to this; and in the few that have been found it has been impossible to secure assurance that the product tested did not contain asphalts or improper fillers. In one instance a cube of enamel followed the usual procedure for approximately 2½ years. Then it suddenly bulged on all sides, and the moisture content rapidly rose to over 18%. This is mentioned to indicate the length of time sometimes required to determine the characteristics of an untried product.

Tar base enamels are not subject to the moisture absorption tendencies found in asphalts. Mixing the two has been found undesirable.

Dehydration

Tar base enamels do not contain oils such as are found in asphalts; and therefore, there is no tendency for evaporation to occur. After years of burial, coal tar enamels have been found to have practically the same characteristics as when first processed.

Dielectric Strength

The dielectric strength of coal tar enamels runs as high as 40,000-50,000 volts. There is some decrease with age but it is not ordinarily sufficient to destroy the effectiveness of the coating. When testing enamels in the field the voltage used is seldom over 10,000-15,000 volts. Coal tar enamel has a higher average dielectric strength than any other widely used coating.

Toxic Properties

Tar base enamels are not toxic to plant life or bacteria. Roots are frequently found penetrating the enamel when it is not properly shielded, and corrosion often proceeds more rapidly where roots are against the metal than where only soil is in contact. Instances have been cited where some form of boring insect has drilled holes through enamels.

Fillers

Fillers are used with tar base enamels, the quantity running as high as 40%. The usual variation is from 20% to 40%. Some experiments have been conducted using larger quantities.

Effect on Other Coatings

Where the heat of application has no effect on other coatings, coal tar enamels will not damage nor be damaged by other types of coatings. Some cut backs have coal tar solvents as a vehicle, and in such instances a small amount of the enamel may be absorbed by the cut back material.

Uniformity

A variation of plus or minus 3° F. in melting point may be established for coal tar enamel if desired, and the maximum established at 7° or 8° F. Development of coal tar enamels has progressed so that the original advantages of asphalts as to melting point, penetration, brittleness, temperature, susceptibility, etc., can be readily and consistently reproduced.

Fuming Temperature

The fuming temperature is that at which the melted enamel commences to emit a vapor, having a strong characteristic tar odor, which vapor is irritating to the skin, particularly when a person is perspiring. The fuming temperature is usually above that required for application, and therefore is within control of the kettle operator. Other advantages being equal, it is desirable to secure an enamel having a high fuming temperature. The fuming temperature is seldom part of the specifications, but it is desirable to know how high it is.

Enamel Application

Material

The desired quality of enamel has been previously discussed. A manufacturer when filling an order for coating desires to know the method to be used in applying the enamel, the location, the season of year during which application will be made, the thickness desired and the melting point requirements.

Quantity Required

The quantity is most frequently specified in pounds of enamel. The total bulk of enamel required is dependent upon the weight per cubic foot of the material, and the length and size of pipe to be protected. The specific gravities of the commonly used tar and asphalt base enamels vary considerably because of differences in the character of the filler used, and to a lesser extent, differences in gravity of the basic material. The en-

(Continued on page 48)

TITAN WATER HEATER CONTROLS

AGA Approved TITAN Temperature and Pressure Relief Valve

This device is installed on the hot water outlet in the tank directly in the flow of water. Action, as a result, is unfailing and positive, there being no dead pockets to prevent proper functioning of relief valve.

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(Continued from page 46)

ameling materials in common use weigh between 70 and 110 pounds per cubic foot. Asphalt enamels are among the lightest, while tar base materials weigh more per cubic foot. Soft asphalt coatings, not classed as enamels, weigh less than asphalt base enamels. The following table will aid in estimating the quantities to order:

Cubic Feet of Hot Coating Required for 1000 Feet of Standard Pipe

Standard Pipe, Size in Inches	*Bare Pipe Exterior Surface Sq. Ft. per 1000'*	*Theoretical Cu. Ft. of coating per 1000' 3/64" thick*	*Theoretical Cu. Ft. of coating per 1000' 4/64" thick*	*Theoretical Cu. Ft. of coating per 1000' 6/64" thick*
¾	258	1.00	1.33	2.00
1	344	1.32	1.76	2.64
1¼	435	1.71	2.28	3.42
2	622	2.43	3.24	4.86
3	916	3.58	4.77	7.16
4	1178	4.60	6.13	9.20
6	1734	6.77	9.03	13.54
8	2258	8.84	11.79	17.68
12	3338	13.05	17.40	26.10
16	4189	16.37	21.84	32.75
18	4712	18.42	24.57	36.84
20	5236	20.47	27.30	40.94
24	6283	24.56	32.76	49.13
30	7854	30.70	40.95	61.41
36	9425	36.84	49.14	73.69

To ascertain the quantities of any materials in pounds, multiply the cubic feet per 1000 feet of pipe for a given thickness by the weight per cubic foot.

For any other thickness than that given in the table, the requirements will be in direct proportion to the thickness. For instance, for a coating 2/64" thick the cubic feet of coating per 1000 feet of pipe would be one-half that shown in the column for a 4/64" thickness.

If a minimum thickness of 3/64" is desired and the application is to be in the field, it would be necessary for practical purposes to use the quantities as shown in the column for 4/64" in order to care for variations in thickness. If the coating is to be mill or central station applied, it would be necessary to add only approximately 10% to the quantities shown.

There is considerable loss when hot coatings are applied in the field; and therefore, to the quantities already determined, an additional 20 to 25% should be added for loss of material. The use of machines and extra care has in some instances brought this percentage as low as 15%. For mill and central station coating a percentage loss of 5% and 10% respectively have been found to be average practice.

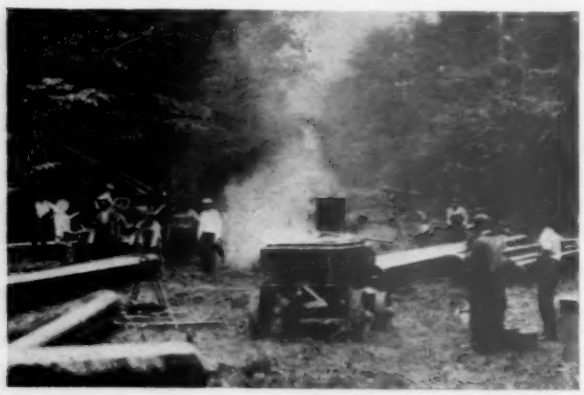

Photo courtesy Wailes Dove-Hermiston Corp.

Kettle used for melting during enamelling operation.

For approximation and checking computations of the coating required the following table may be used:

Quantity of Hot Coating Required per Mile of Pipe

(This table is intended for field wrapping. For yard or mill wrapping, economies of from 20 to 25% are effected.)

Nominal Pipe Size, Inches	*Bare Pipe, Outside surface area per mile, sq. ft.*	*(Based on uniform 1/16" thick coat)* *Asphalts, lb. per mile*	*Asphalt Enamels, lb. per mile*	*Tar Enamels, lb. per mile*
2	3,283	1,805	2,700	2,257
4	6,220	3,419	4,400	4,274
6	9,158	5,032	6,300	6,290
8	11,922	6,552	8,200	8,191
10	14,860	8,166	10,000	10,208
12	17,624	9,687	11,800	12,109
14	19,352	10,636	15,200	13,295
16	22,117	12,156	17,500	15,196
18	24,881	13,674	19,500	17,093
20	27,646	15,194	21,000	18,993
22	30,411	16,715	23,000	20,894
24	33,175	18,232	25,000	22,791
26	35,940	19,752	27,000	24,691
28	38,704	21,272	29,000	26,590
30	41,469	22,792	31,000	28,490
32	44,234	24,311	33,000	30,389
34	46,998	25,840	35,000	32,300
36	49,763	27,350	37,000	34,188

(*Courtesy of Johns-Manville Co.*)

Shipment of Coating

The coating is usually received in steel drums containing from four to five hundred pounds of material. The white washing or otherwise treating of the interior surface of the drum by the manufacturer facilitates removal of the enamel. The drums are usually of a fifty gallon capacity.

The spot checking of specifications for the material is advisable; and therefore, the manufacturer should be requested to place some identification on each drum so that variations may be traced back to a particular batch or run.

Handling and Storage

Unopened drums of enamel may be stored outdoors.

Damage to the container during storage or transportation will delay the kettle operator because of the inconvenience in removing the material. Do as little damage as possible without adding to the cost of handling.

Any material left in the kettles at the end of a day or job should not be returned to storage, but junked. The job should be planned to have practically no enamel in the kettle at the completion of the day's run.

Heating Equipment

Enamel should be melted in kettles designed for that general type of service. Equipment made by reputable manufacturers will usually be found more satisfactory than home made units.

In order to minimize the danger of local overheating, modern enamel kettles are designed to avoid concentration of heat at any one point. Provision is made for distribution of the heat not only at the bottom of the kettle, but also up along the sides to a position above the liquid level.

A kerosene or white oil pressure burner is generally used. This type of burner has been developed so that a moderate amount of control is possible. Wherever gas is available it is generally used because of greater ease and accuracy of control. To facilitate the use of gas when possible, interchangeable burners are available and these require only a few moments to change. Gas lends itself readily to complete automatic control, a much needed improvement on enamel kettles.

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Obituary

JOHN N. SHANNAHAN

John N. Shannahan, president of the Northern Indiana Public Service Company and beloved figure in national business circles, died August 16th at Belgrade Lake, Maine.

Mr. Shannahan, who headed a number of public utility companies operating chiefly in Indiana, had been in ill health for some time and had gone to Maine for a rest.

"In the death of Mr. Shannahan, the utility industry throughout the nation suffers an irreparable loss," said Dean H. Mitchell, vice-president and operating head of the Northern Indiana Public Service Company, when he was informed of Mr. Shannahan's death. "He not only was essentially a keen business man, but he had, in addition to his ability, a kindliness and a graciousness which made all of those who came in contact with him admire him greatly, and evoked a deep affection on the part of those associated with him intimately."

A former director of the Chamber of Commerce of the United States and past president of the American Electric Railway Association, Mr. Shannahan was active in the councils of the utility industry. He always insisted on the utmost frankness on the part of utilities in dealing with the public, and it was his idea that outstanding local business men in the territories served by the public utilities he headed be selected for the boards of directors of the various operating companies.

Mr. Shannahan, who was 66 years old, had spent forty years of his life in the utility industry. The principal operating companies in the group headed by Mr. Shannahan were Northern Indiana Public Service Company, which serves the northern third of the state; Public Service Company of Indiana, which serves most of the southern and south central parts of the state; Indiana Service Corporation, with headquarters at Fort Wayne; Northern Indiana Power Company, in the north central part of Indiana; Chicago South Shore & South Bend Railroad; Gary Heat, Light & Water Company and the West Ohio Gas Company, whose principal offices are at Lima.

Mr. Shannahan's death followed by less than twenty-four hours that of A. V. Grief, vice-president and general manager of Gary Heat, Light & Water Company, who died on the same date of a heart ailment.

FRED A. MILLER

Fred A. Miller, national figure in the gas industry, and Honorary Board Chairman of S. R. Dresser Manufacturing Company, died August 22, at Beechwood, his home at Bradford, Pa.

Death was attributed to a heart ailment. He had been in failing health for several months.

Long a prominent figure in the growth of the gas industry, Mr. Miller was for thirty-five years associated with S. R. Dresser Manufacturing Company, Bradford, Pa. Joining Dresser in 1903, he became successively Secretary-Treasurer, and in 1911, President, upon the death of Mr. Solomon R. Dresser, the original founder of the company. In 1929, Mr. Miller was made Chairman of the Board of Directors. He resigned from this position May 27, 1938, on his 70th birthday. The Directors later named him Honorary Chairman in recognition of his valuable services to the company.

FRED A. MILLER

During his lifetime, Mr. Miller took a prominent part in the phenomenal growth of the natural-gas industry in this country—from the time that gas was first used only in the localities where it was produced.

Mr. Miller's character, business integrity, and capacity for making and holding friendships won for him a place of high respect and distinction in gas-industry circles, where he was widely known. At one time, he was President of the Natural Gas Supply Men's Association and later a Director of the American Gas Association.

Born May 27, 1868, at Belmont, N. Y., Mr. Miller came with his family to Bradford at the age of twelve and resided there until his death.

Shortly before his death, Mr. Miller was presented with a silver memorial scroll, given to him by his friends and associates in the Dresser Company "in tribute to his sterling character, high principles, eminent leadership, and devotion to the Dresser Company."

EDWARD OLSEN

Edward Olsen, meter superintendent of the Citizens Gas and Coke Utility, whose record of 66 years of continuous service with the Indianapolis Utility is believed to be the longest in the gas industry, died August 20 at the age of 85. He was still active at the time of his death.

Born in Denmark in 1853, Mr. Olsen emigrated to this country as a youth of 19 and promptly obtained employment in the remodeling of the Indianapolis gas plant. In 1875, he was assigned to reading and setting meters. In this work he often traveled long distances on foot carrying four meters, two on a strap which hung around his neck and two in his hands.

During his extraordinary career with the utility, Mr. Olsen served under five different managers and witnessed an increase in the number of meters served from 3,000 to the present 85,000. Because of his wide experience and extreme consideration for the welfare of his men, he was familiarly known as "Pop" to everyone from the general manager to the lowliest employe.

Gas Piped Secretly to Altar

The fire worshippers of Iran believed in supernatural powers of their priests and prostrated themselves before the flames which leaped from their altars and seemed to burn eternally from no visible source. What these worshippers did not know was that they were actually worshipping flames fed by natural gas. The worshippers lived centuries before the birth of Christ and only just before the turn of the century the ruins of some of these mystic temples were still standing at Baku on the shores of the Caspian Sea. Examination showed that the altar had been built over a fissure in the earth from which natural gas issued. A secret pipe conducted the gas from fissure to the altar.—*Blue Blaze News.*

Gas Boiler Solves Summer Steam Problem

The E. J. McLeer & Company were recently confronted with the problem of finding a source of steam to supplant the shutting down of their heating plant for the summer months. Steam is used for cleaning all oily metal sheets before painting for assembly. The application of a small gas-fired boiler supplied their demands for all steam processing applications. The installation was made with the cooperation of the Industrial Division of The Philadelphia Gas Works Co.

Gas For Plows

A large maker of farm implements, the Syracuse Chilled Plow Co., Inc., Syracuse, N. Y. recently installed the following gas fired equipment: a continuous hardening furnace and a continuous draw furnace of 2550 lbs. per hour capacity each, a core oven, two oven furnaces, three unit heaters, 20 fryers, and a multi-coil water heater. These were installed under the supervision of the Industrial Department of the Central New York Power Corp.

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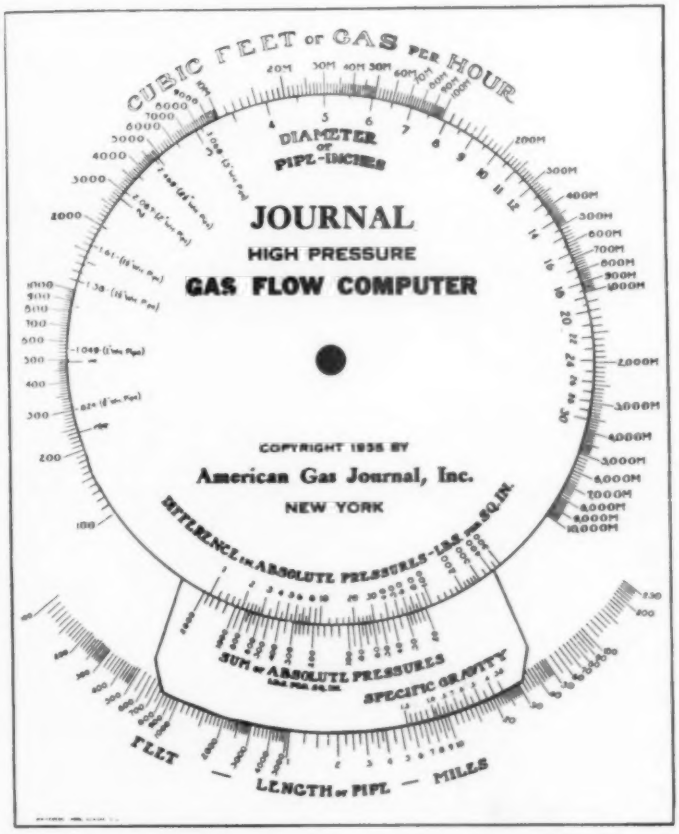

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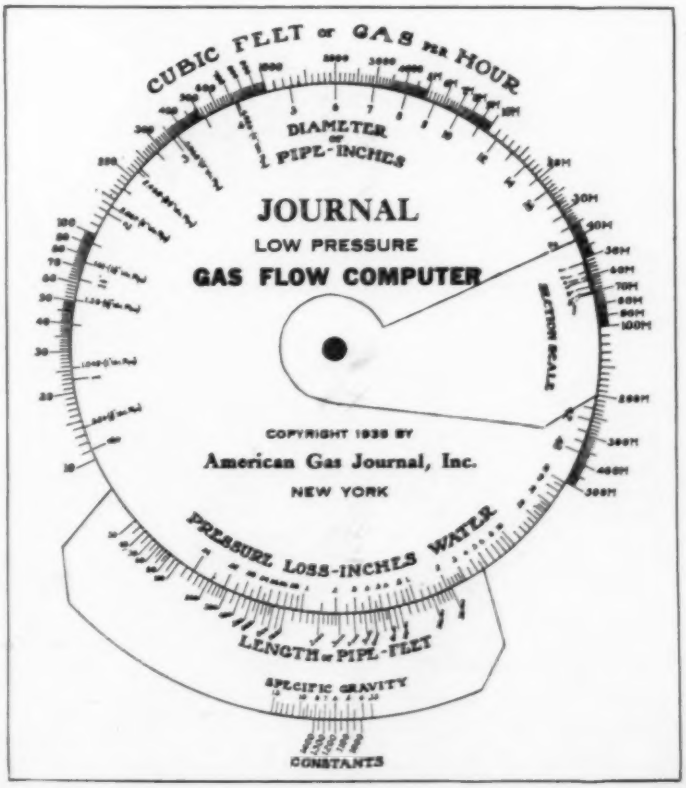

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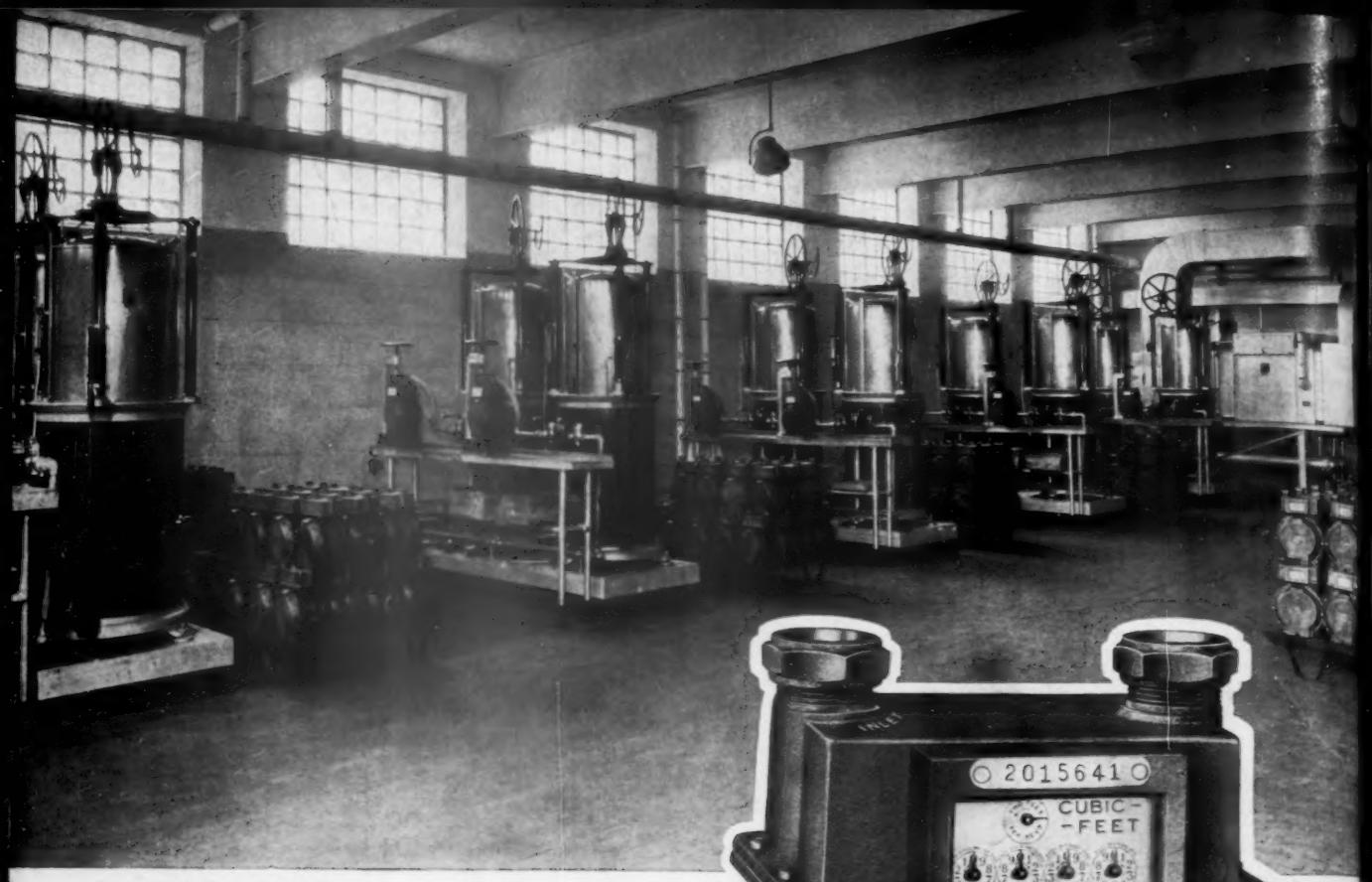

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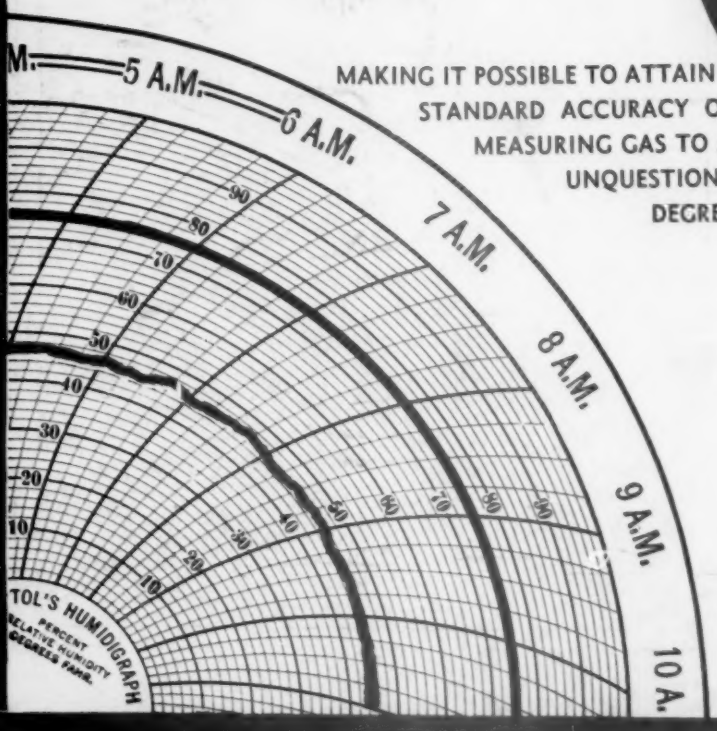

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